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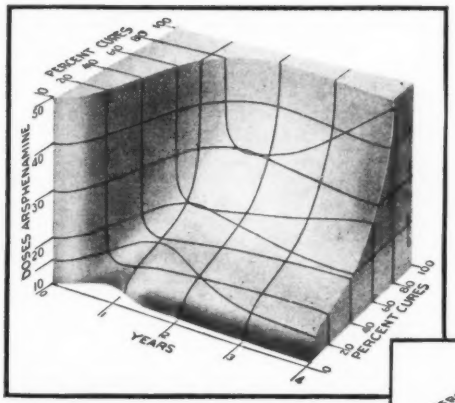

FIG. 1—*Therapeutic surface. Seropositive, primary and secondary syphilis*

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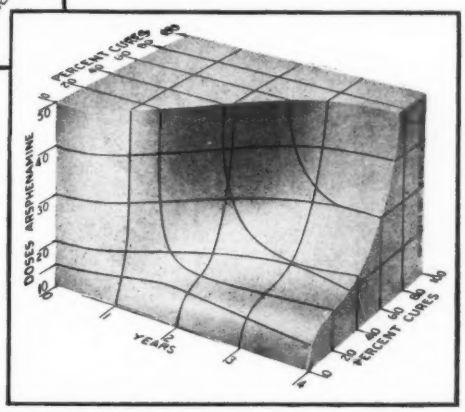

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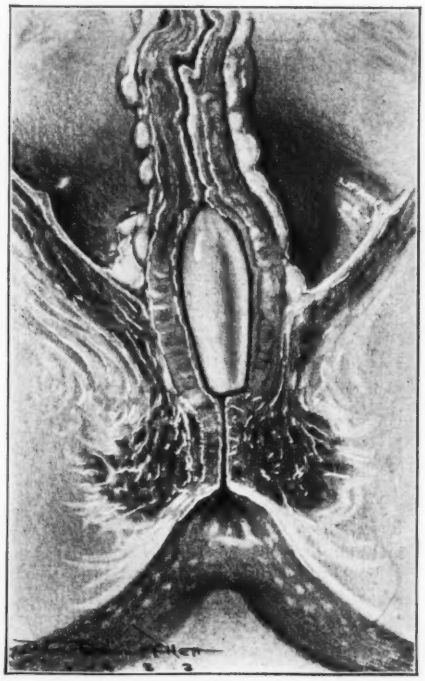

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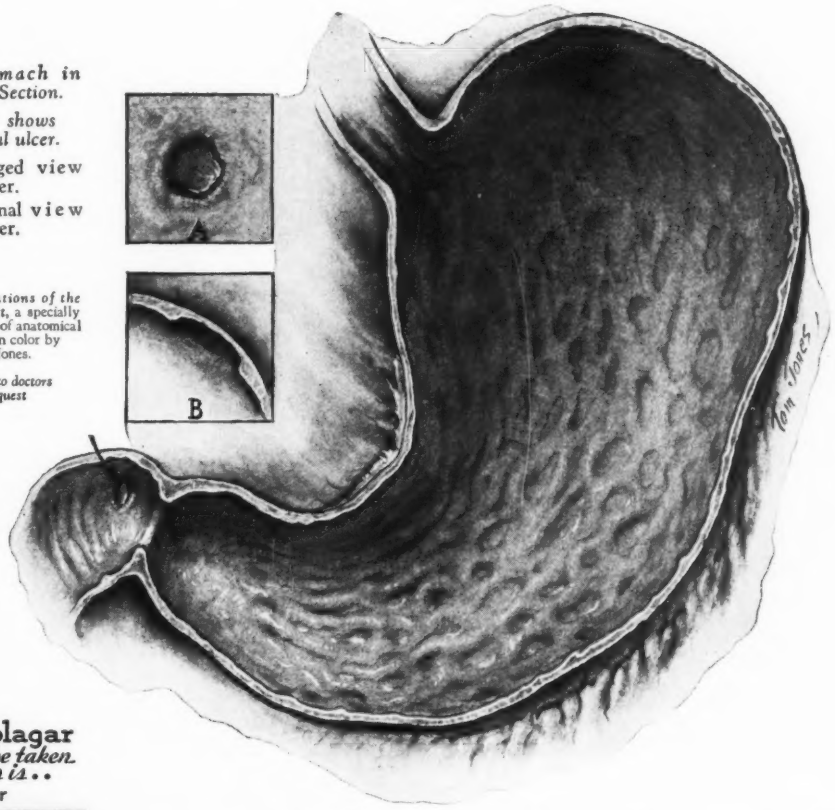

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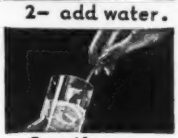

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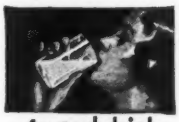

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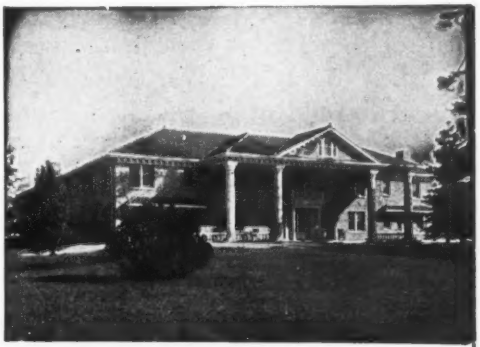

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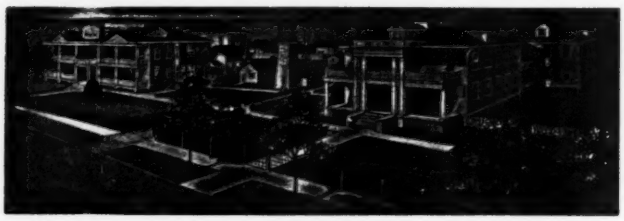

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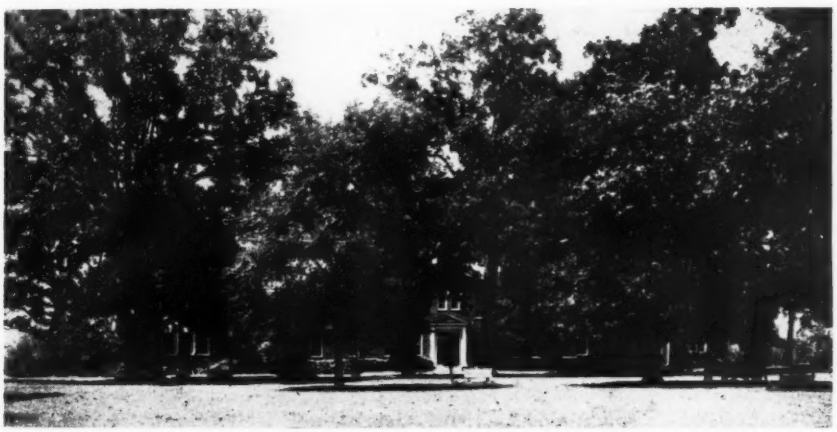

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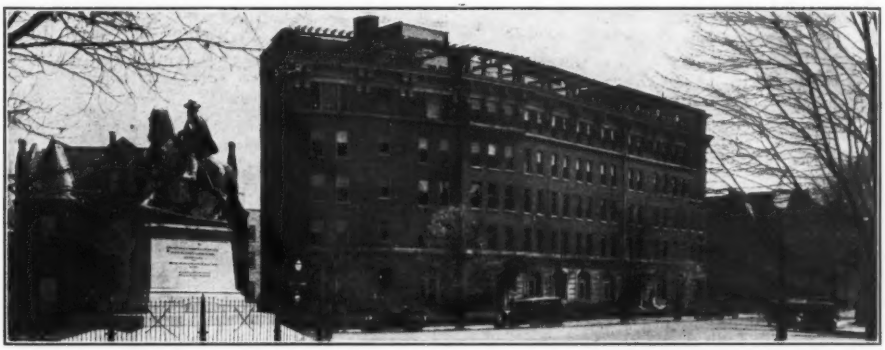

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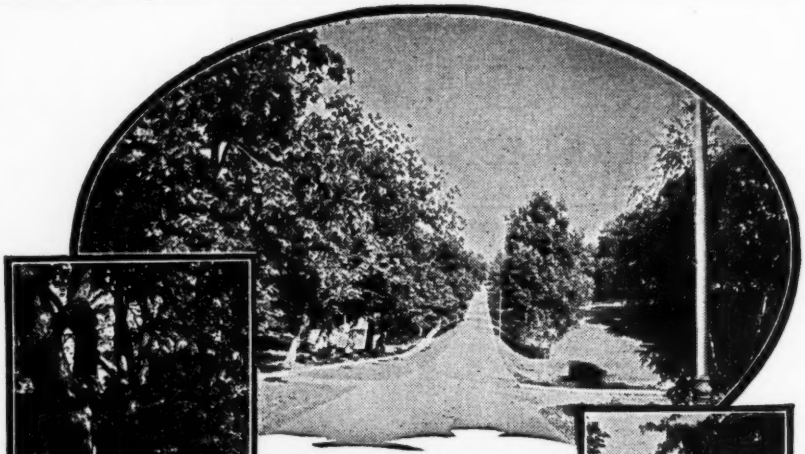

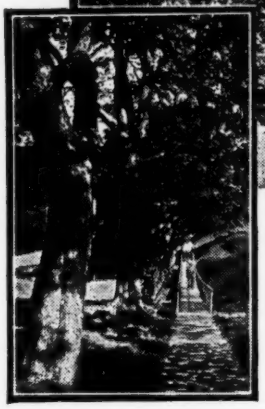

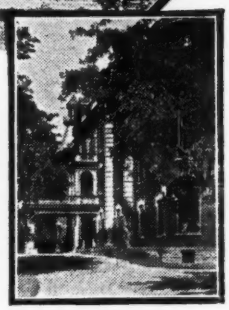

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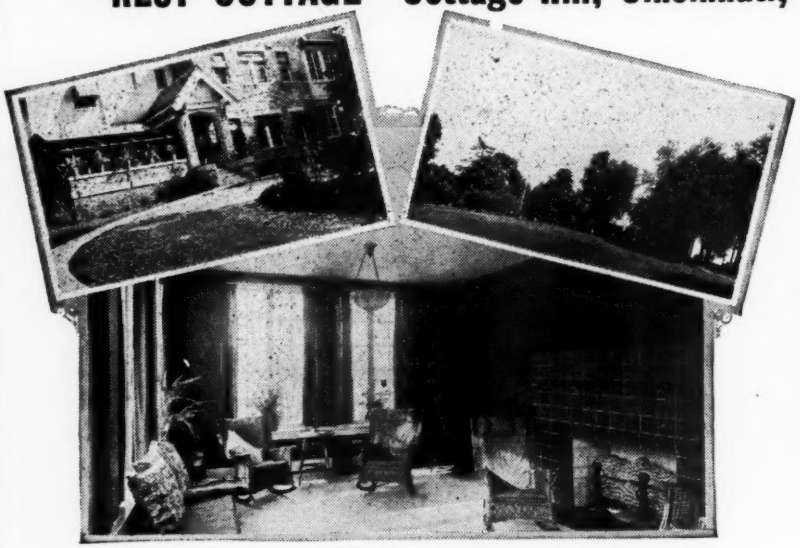

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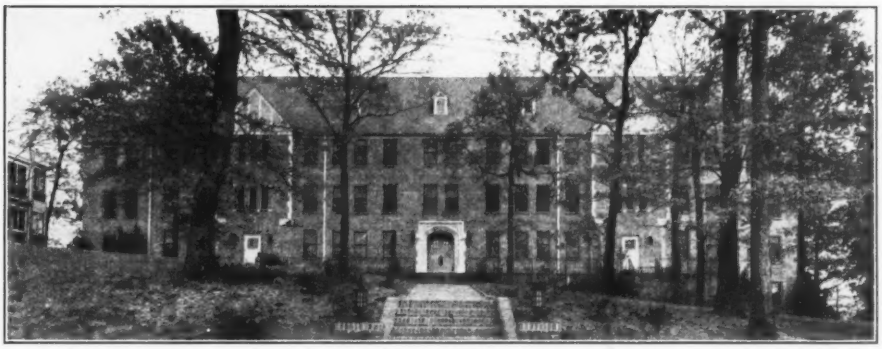

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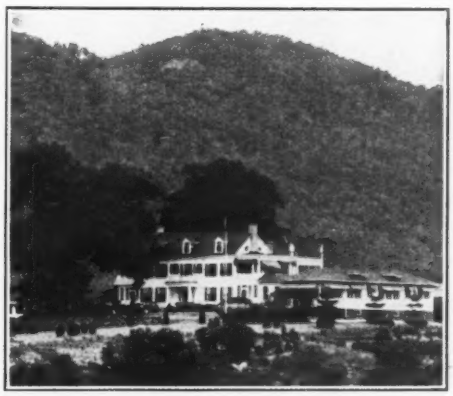

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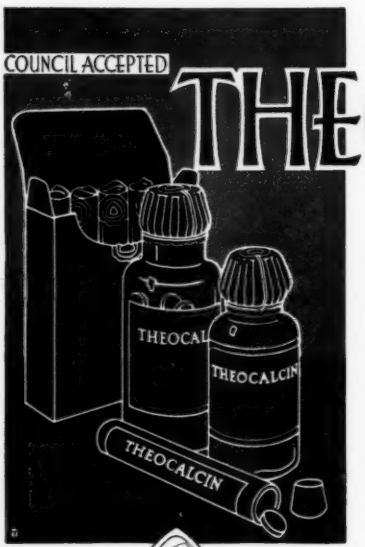

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Volume XXVI OCTOBER 1933 Number 10

FRACTURES AND DISLOCATIONS OF THE TARSAL BONES*

By PHILIP D. WILSON, M.D.,
Boston, Mass.

Fractures and dislocations of the tarsal bones include a variety of injuries which in general are poorly understood and differentiated. While fractures of the os calcis have been the subject of considerable attention and study, the other tarsal injuries have been relatively neglected. It is the purpose of this paper to consider each of these various injuries, to point out their special features, and to indicate what appear to be the best methods of treatment. This study is based upon data gathered in a review of 4,066 consecutive patients with a total of 4,536 fractures and dislocations treated by the staff of the Fracture Service of the Massachusetts General Hospital between the years 1923 and 1930, inclusively. The fractures and dislocations of the tarsal bones numbered 84, or practically 2 per cent of the entire series. For the purpose of increasing the material I have added 34 similar injuries in private patients treated by me during the same period, thus making a total of 118 cases. These were divided as shown in *Table 1*. It is interesting to note that only 8 of the injuries were compound, a very low incidence indeed in the entire group.

Table 1

DISTRIBUTION OF INJURIES OF THE TARSAL BONES

	M.G.H. Group	Per Cent Total M.G.H. Injuries	Private Cases	Total
Tarsometatarsal dislocations	0	0	3	3
Fractures of cuneiforms and cuboid	9	.2	1	10
Fracture of scaphoid	13	.26	4	17
Subastragalar dislocations	6	.13	3	9
Total dislocations of astragalus	2	.04	1	3
Fractures of astragalus	16	.38	1	17
Fractures of os calcis	38	.85	21	59
Totals	84	1.86	34	118

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

*From the Fracture Service, Massachusetts General Hospital, Boston, Massachusetts.

General Principles.—Before proceeding to a discussion of the individual injuries, it will be of advantage to state certain general principles which I believe should govern the treatment.

(1) Normal foot function is dependent upon maintenance of the proper weight-bearing lines of the foot and of the spring support mechanism of the plantar arch. Bony displacement which alters the weight-bearing lines or disturbs the arch must be corrected.

(2) The plantar structures are especially adapted for weight-bearing purposes. Bony prominences on the plantar surfaces must be prevented.

(3) The tarsal joints are called upon to perform the heavy duty of bearing the body weight and irregularities of the joint surfaces resulting from intra-articular fracture lead to uneven bearing and degenerative changes in the cartilaginous surfaces, and produce irritation and painful function. The only complete remedy is operative fusion of the involved joint.

(4) In the case of fractures with extensive comminution and deformity of one of the joint surfaces where *restituto ad integrum* is obviously impossible, the probability of later painful function may be anticipated and the operation of arthrodesis performed early for the purpose of shortening disability time. The results of fusion operations are better when performed early rather than late.

(5) In injuries involving the astragalus the removal of this bone may be necessary, but its replacement is always preferable when possible, even if this necessitates operative fusion of one of its joint surfaces. When astragalectomy is necessary the well established principles governing this operation should be observed, including backward displacement of the foot.

(6) In the post-reduction or postoperative treatment of fractures and dislocations of the tarsal bones when plaster fixation is employed early weight-bearing should be encouraged by the use of a steel stirrup incorporated in the plaster according to the method of Böhler.

(7) When fixative treatment is ended and active use permitted the foot should be supported temporarily in correct weight-bearing position by the use of tilted heels, metatarsal bars, arch supports, or other braces as indicated.

(8) At the same time the circulation should be stimulated, the swelling reduced, joint stiffness overcome, and the strength of the extrinsic and intrinsic muscles of the foot developed by the use of physical therapy, chiefly bandaging, contrast bathing, and active exercises.

(1) *Tarsometatarsal Dislocation.* — Dislocation at the tarsometatarsal or Lisfranc's joint may involve only a single metatarsal, or several, or all of the metatarsal bones. It is a rare injury, and no single example of it was found in the hospital group of cases. Three instances of it were encountered in private patients.

In all instances the injury was produced by a fall of from four to ten feet, striking on the plantar flexed and inverted foot. One patient had an accompanying fracture of the scaphoid bone of the other foot. This patient was seen early, and the dislocation involving the base of the first metatarsal was reduced by the closed method followed by fixation in plaster with the ankle at right angle flexion. Open reduction was required in the other cases, the first a dislocation outward of the fourth and fifth metatarsals, and the second a dislocation outward of the bases of all five metatarsals accompanied by a fracture through the neck of the second metatarsal (*Fig. 1*). Both patients were seen only 10 to 12 days after injury.

The question arose in these cases of how the reduction could be maintained following operation since with the tearing of the capsular ligaments the flat joint surfaces afforded no stability. This problem was solved by drilling both the bases of the metatarsal and the opposing joint surfaces and suturing them with silk. Splinting was by a plaster of Paris casing to the knee with the foot at right angle flexion for periods of 4 and 6 weeks, respectively.

Complete recovery was obtained in the patients with the dislocations of the isolated metatarsals, but the third case is too recent to permit an end-result appraisal.

(2) *Fractures of the Cuneiform and Cuboid Bones.*—There were only 9 instances of fracture of the cuneiform or cuboid bones in the Massachusetts General Hospital group of 4,536 skeletal injuries. These occurred either singly or in combination with other injuries as shown in *Table 2*.

The injuries of the anterior tarsal bones were produced either by a fall with the foot in plantar flexion and inversion or eversion, or by direct

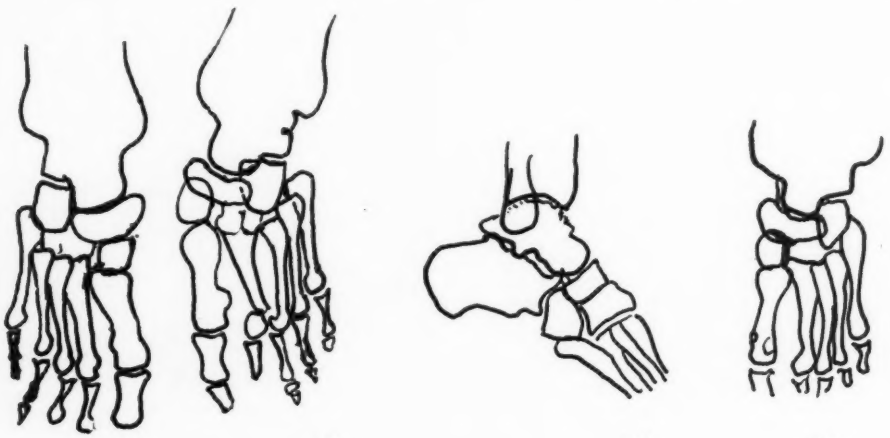


Fig. 1

Tarsal metatarsal dislocation, involving the bases of all of the metatarsals.
(A) Preoperative: (a) Normal foot; (b) Injured foot.
(B) Post-reduction views of injured foot. Replacement was secured by open operation.

Table 2

FRACTURES OF ANTERIOR TARSAL BONES

Fractures of cuboid alone		4
Chip or sprain fractures	2	
Simple transverse fractures	2	
Fractures of internal cuneiform alone		2
Compound fracture (bullet wound)	1	
Simple comminuted fracture	1	
Fractures cuboid and internal cuneiform together		1
Fractures cuboid, all cuneiforms, and of ankle joint with adduction and varus deformity		1
Fractures scaphoid and internal cuneiform		1
Total		9

violence from the fall of a heavy object or a wheel running over the foot. Only one of these fractures was accompanied by serious bony deformity, and in this case there was a severe fracture dislocation of the ankle as well. The patient was not seen until several months after injury, and it was necessary to perform an osteotomy through the cuboid region to correct adduction deformity of the forefoot. The patient returned to work 10 months later. In the other cases the treatment consisted in moulding the bones into position with the patient anesthetized and the application of a plaster casing to retain position.

The follow-up was defective in these cases, and although the immediate results were good, the end-results are unknown in all but the patient in whom the osteotomy was performed. From a review of the cases, however, it seems fair to conclude that fractures of the cuboid or cuneiform bones, either singly or in combination, are of no serious significance when uncomplicated by other injuries.

(3) *Fractures of the Scaphoid.*—There were 13 patients with fracture of the tarsal scaphoid in the Massachusetts General Hospital group of fractures and dislocations. I have added to these 4 private cases. The age distribution is shown in *Fig. 2*. Complicating injuries were encountered in 7 cases, and comprised the following:

Fracture internal cuneiform	1
Fracture internal cuneiform and cuboid	1
Fracture of ankle	2
Fracture of metatarsals	2
Fracture os calcis and patella	1
Subastragalar dislocation	1
	8

The types of fracture were as follows:

Chip or sprain fractures	2
Comminuted fractures without displacement	4
Crush fractures	9
Compound fractures	2
	17

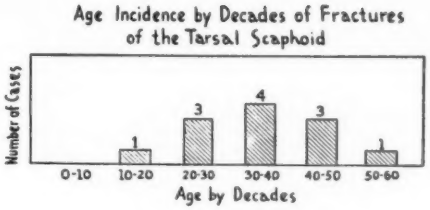


Fig. 2

The characteristic fracture of the scaphoid is a compression fracture produced by a fall and striking on the foot with the ankle in plantar flexion. The force is transmitted upward through the metatarsals and the scaphoid is crushed between the cuneiforms and the head of the astragalus. There is mushrooming of the scaphoid and protrusion of fragments on the dorsal surface. The joint surfaces are comminuted and displaced, and unless reduction is secured, painful function will surely result.

When the patient is seen immediately after the injury closed reduction should be attempted. This is to be accomplished by opening up the space between the astragalus and internal cuneiform by means of forced plantar flexion of the forefoot and ankle combined with direct pressure over the dorsal surface of the fracture. A plaster casing extending to the knee and maintaining the position of plantar flexion should then be applied. If reduction is shown by x-ray to be satisfactory, then fixation should be maintained for a period of 6 to 8 weeks following which active use may be permitted.

When complete reduction cannot be accomplished, or when the fracture is seen only after the lapse of 8 to 10 days, arthrodesis of the astragalo-scaphoid joint should be advised. Our observations show that painful function is the invariable result of unreduced fractures of the scaphoid, and that the painful symptoms can be completely relieved by this operation. The amount of motion permitted by the scaphoid-cuneiform joint is so slight that fusion of this articulation does not seem necessary.

Of our 9 patients with crush fractures of the scaphoid, only 4 were seen immediately after injury. Reduction was attempted in these, but was successful only in 2; fusion was performed in the remainder. We believe that the failures were due to inexperience, and that a higher percentage of successful results would be obtained now. The remaining 5 patients were admitted from 2 weeks to 1 year after injury, the aver-

age time being 6½ months. Fusion was performed in 4 of these patients, and 1 refused treatment. The results so far as they are known are shown in *Table 2*. The fair result following fusion was in a patient with an associated fracture of the cuneiform bones which necessitated osteotomy of the forefoot. This complicated the convalescence, and the result should not in fairness reflect on the merits of arthrodesis. All of the patients upon whom astragaloscaphoid fusion was performed returned to their old work, and the average disability time following operation was 7½ months (*Fig. 3*).

Table 3

RESULTS OF TREATMENT—FRACTURES OF SCAPHOID

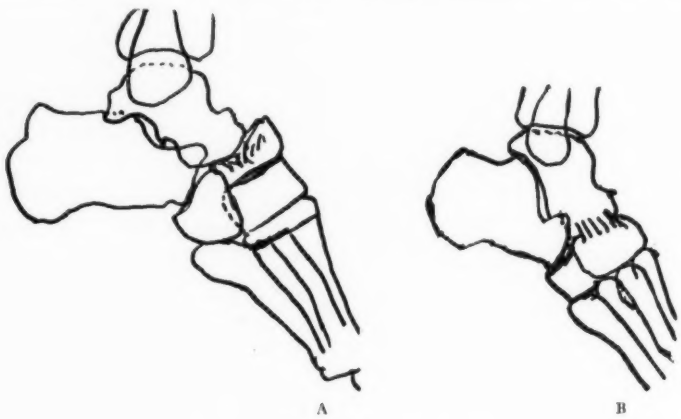
Method of Treatment	Total	Good	Fair	Poor	Unknown
Reduced and fixed in plaster	2	2			
Astragalo-scaphoid fusion	6	5	1		
Excision of loose fragment	1	1			
Debridement and fixation in plaster	1				1
Plaster fixation only	5				5
No treatment	2				2
Total	17	8	1	0	8

(4) *Dislocation of the Astragalus.* — Two types of dislocation of the astragalus must be differentiated; the incomplete or subastragalar dislocation, in which the os calcis and scaphoid are displaced from their normal relations with the inferior and anterior articular surfaces of the astragalus; and the total or complete dislocation in which the astragalus is rotated and dislocated at its articulations with both the os calcis and with the tibia.

(A) *Incomplete or Subastragalar Dislocation of the Astragalus.*—Incomplete or subastragalar dislocation occurs with fair frequency, and 6 instances of it were encountered in the Massachusetts General Hospital group of cases. In addition I have met with the injury three times in private practice. With the exception of 3 patients aged 56, 65, and 69 years respectively, all of the others were between 12 and 24 years of age. This age incidence is curious as it avoids the middle age group, and suggests that in this period there is a greater liability of the bones to fracture than to dislocation.

The injury was generally the result of severe violence, one patient being struck by a train, another by an automobile, another by the fall of a barrel, another getting his foot entangled in the cable wheel of an elevator, while the remainder fell, twisting their feet.

The foot was displaced outward in 4 instances, the head of the astragalus protruding to the medial side of the scaphoid; while in 4 patients the displacement of the foot was to the inner side with the head of the astragalus lying lateral to the scaphoid. In one patient the type of dislocation was not recorded. As a rule there was moderate posterior displacement of the foot under the astragalus. In one instance there was an associated fracture of the scaphoid, and in another a partial crush of the head of the



A B

Fig. 3

Old compression fracture of tarsal scaphoid.

(A) Appearance six months after injury, showing mushrooming anterior protrusion and irregularity of the astragaloscaphoid joint.

(B) Appearance one year after astragaloscaphoid fusion. Patient was completely relieved.

astragalus. Three patients were not seen until 4 to 5 months after injury, and in them the true nature of the injury had not been recognized. In fact, in cases with slight displacement, it is easy to err in the matter of diagnosis, as the dislocation may not be evident in the lateral roentgenogram. In checking the reduction it is of great importance to have a plantar view showing clearly the relations of the head of the astragalus to the scaphoid (*Fig. 4*).

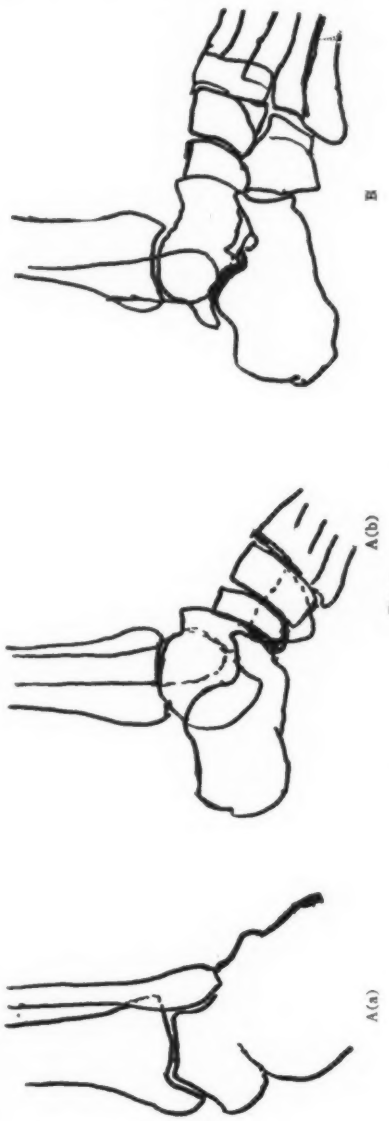


Fig. 4

Subastragalar dislocation with foot displaced upward.
(A) Appearance before reduction: (a) Antero-posterior view; (b) Lateral view.
(B) Post-reduction view. Complete replacement was secured by closed manipulation.

When the dislocation is seen shortly after injury, reduction can usually be accomplished by the closed method under anesthesia. The foot should be drawn forward under the astragalus, the leg being fixed with the knee flexed, by an assistant, and it should then be forced into inversion or eversion, depending upon whether the foot is displaced outward or inward. When difficulty is experienced in securing reduction, ice tongs may be applied to the body of the os calcis with advantage in exerting traction and leverage. In a recent case not included in this group with outward displacement of the foot closed reduction could not be accomplished, and it was discovered at open operation that the posterior tibial tendon had slipped over the head of the astragalus. It was necessary to divide the tendon in order to secure reduction. This possibility must be borne in mind. Following reduction fixation should be secured by the application of plaster extending to the thigh and maintaining the knee in flexion and the ankle in right angle flexion. Fixation should be maintained for a period of 4 weeks, when motion may be permitted. Weight-bearing ought not to be allowed until the end of 8 weeks.

When the patient is seen only after the lapse of five days, open reduction is generally advisable and necessary. After the lapse of 3 to 4 weeks cartilaginous degeneration has usually progressed to such a stage that restoration of function is no longer possible, and in such cases arthrodesis of the calcaneo-astragalar and astragalo-scaphoid joints should be performed after the bones have been replaced. Reduction is best accomplished through both medial and lateral incisions, the former exposing the astragalo-scaphoid joint and the latter the subastragalar joint.

The various methods of treatment employed in our group of 9 subastragalar dislocations and the end-results in so far as they are known are shown in *Table 4*. One of the dislocations was compound with extensive laceration of the structures at the inner side of the ankle and soiling of the exposed joint surfaces. Debridement with reduction of the dislocation was performed immediately, but had to be limited in its scope because of serious complicating injuries and severe shock requiring blood transfusion. Sepsis developed, and it was necessary to amputate below the knee on the thirteenth

Table 4

TREATMENT AND RESULTS IN SUBASTRAGALAR DISLOCATIONS

Method of Treatment	Total	Good	Fair	Poor	Unknown
Closed reduction and fixation in plaster	3	2			1
Open reduction and fixation in plaster	1	1			
Debridement and reduction, later amputation	1			1	
Open reduction and arthrodesis	4	4			
Total	9	7	0	1	1

day. The patient recovered, but died ten months later from acute gastric hemorrhage.

(B) *Total Dislocation of the Astragalus.*—Rotary total dislocation of the astragalus is among the more rare of the tarsal injuries and only 2 instances of it were found among the Massachusetts General Hospital group of cases. I have added a third private case. In all instances the injury was produced by a fall of 18 feet or more and striking on the foot, probably in the pronated position. It was associated with fracture of one or both malleoli or separation of the tibio-fibular junction in every case. The displacement was identical and consisted in a medial rotation of the astragalus on its long axis so that the superior articular surface faced inward and subastragalar joint surface outward. The head of the bone was dislocated from its articulation with the scaphoid and usually projected outward.

Because of the thin, soft tissue covering, the gross displacement and the extreme violence involved, total dislocations of the astragalus are generally compound. This was the case in two of our patients, and they presented ragged wounds on the medial side of the ankle with the articular surface of the astragalus protruding and covered with dirt. Debridement was performed immediately, and in one case the soiled articular cartilage was removed, the astragalus replaced, and the wound left open. Fixation was secured by the application of skeletal traction by means of a pin through the heel in conjunction with a Thomas splint. The wound remained clean, but it was necessary to perform an arthrodesis of the ankle one year later because of persistent pain. The result was excellent, and the patient was able to resume all normal activities. In the second case it was judged unsafe to replace the astragalus, and astragalectomy was performed with the application of a plaster casing. The patient made an excellent recovery, but it was necessary to perform a supramalleolar osteotomy one year later to correct a varus deformity caused by separation of the fibula from the tibia with consequent widening of the ankle mortise. The final functional result was less good than in the patient with the fused ankle joint.

In simple or closed total dislocations of the astragalus it is usually impossible to bring about replacement by the closed method. I know of only one instance where this was accomplished successfully. Traction on the os calcis to open up the space between it and the ankle joint ought to facilitate this procedure, and I see no objection to employing temporary skeletal traction as an aid to manipulation. It is useless to attempt closed reduction unless the patient is seen shortly after injury. On account of the pressure of the displaced bone on the overlying skin there is grave danger that sloughing may occur unless the dislocation is reduced promptly. When this situation exists and closed reduction fails, open reduction ought to be performed immediately. Usually both medial and lateral incisions will be necessary in order to free the astragalus sufficiently to obtain replacement. Reduction should always be the aim in preference to astragalectomy.

In the cases of old, long-standing unreduced dislocation astragalectomy will usually be required. On account of the dense fibrous tissue in which the astragalus is embedded and the shortening of the soft structures replacement would be difficult and unwise. One of our 3 patients presented this problem, and astragalectomy was performed one year after injury with extreme difficulty. The foot was displaced backward, and the end-result was satisfactory, being delayed somewhat by the necessity of performing an arthrodesis of the opposite ankle joint because of a severe unreduced fracture here.

All three of these patients were able finally to return to work after periods of disability ranging from 1 to 2 years.

(5) *Fractures of the Astragalus.*—The review of the Massachusetts General Hospital group of 4,536 skeletal injuries disclosed 15 patients with fractures of the astragalus, or about 0.004 per cent, to which I have added one private case. As shown by the graph (*Fig. 5*) it is an injury that occurs chiefly in young adults, and 14 of

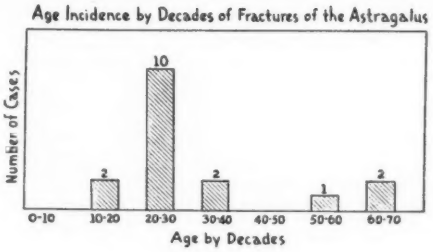


Fig. 5

the 17 patients were between the ages of 18 and 34 years.

Four main types of fracture may be distinguished, and these were distributed as follows:

Chip or sprain fractures	4
Fractures of the posterior trigonal process	3
Compression fractures of the superior articular facet	2
Transverse fractures through the body or neck with dislocation of the posterior fragment	5
Fracture of inferior articular facet	1
Fractures without displacement	2
Total	17

Chip or sprain fractures of the astragalus are chiefly sprains of the external lateral ligament in which a small fragment of bone at the attachment of the ligament is evulsed. They are of no particular significance and should be treated as sprains rather than fractures.

Fractures of the posterior trigonal process of the astragalus are of considerable medicolegal importance because of the difficulty of distinguishing between them and the developmental variation in which the center of ossification has remained separate and formed the os trigonum. This is found in about 10 per cent of normal individuals (*Fig. 6*). A diagnostic point in fracture is the ability to demonstrate roentgenologically a shadow of increased density in the soft parts about the suspected lesion due to swelling. Such fractures are rare, and it is quite possible that an error of diagnosis may have been made in one or more of our 3 cases.

Compression or "check" fractures of the superior articular facet of the astragalus were encountered in 2 patients. The fracture is apparently produced by the anterior margin of the tibia's being driven downward into the superior articular surface of the astragalus with compression of the underlying bone and the production of a projecting margin of undamaged joint surface anterior to the compressed area which impinges against the anterior lip of the tibia and

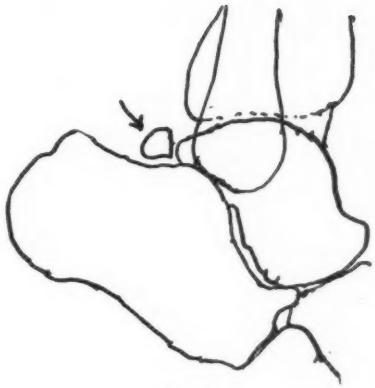


Fig. 6

Os Trigonum. X-ray appearance of os trigonum. This is an anatomic variation found normally in about 10 per cent of individuals. It must be differentiated from fracture of the astragalus.

blocks dorsiflexion (*Fig. 7*). Both of our cases were seen some time after injury; one 10 weeks and the other 5 years, and at this time extensive changes had occurred in the cartilage. In the early stage trimming away the bony block to dorsiflexion and fixing the ankle in dorsiflexion would appear to offer the means of restoring

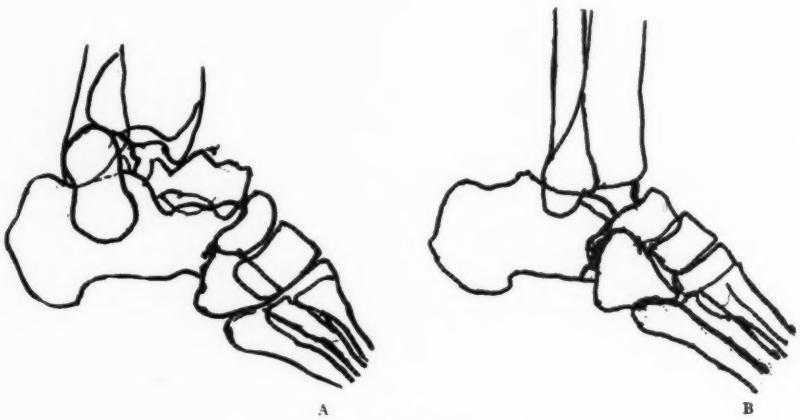
Fig. 7

"Check" fracture of the astragalus. The superior articular surface has been compressed and indented by the anterior margin of the tibia with the production of a bony block that checks dorsiflexion of the foot.

function. In the old cases ankle joint fusion would seem the best solution. In both of our patients the exostosis was removed with fair result in one, but poor in the other. In the latter case extensive fibrous ankylosis was revealed at operation, and it was a mistake not to perform an arthrodesis of the ankle joint.

The most disabling injury of the astragalus is the transverse fracture through the body or

neck usually associated with complete dislocation of the posterior fragment in either the backward or inward direction. This was encountered 5 times, but only 1 was compound. The amount of displacement in these fractures is great and the damage to the soft parts extreme irrespective of whether the fracture is closed or compound, and the nutrition to the dislocated fragment is often cut off. Any attempt to replace the fragments and to obtain union seems unwise; in the patient in which this was done the result proved totally unsatisfactory. Astragalectomy with backward displacement of the foot is the operation of choice. This was done in our other four cases (*Fig. 8*). The results at the end of one year were good in 2, fair in 1, and unknown in 1. Two had returned to work, 1 as driver of a milk team and the other as a farm laborer. The third patient at the end of two years was engaged in litigation relative to industrial compensation, and was still wearing a brace. He was judged to be capable of doing some type of work.



A B

Fig. 8

Compound fracture-dislocation of the astragalus.

(A) X-ray appearance on admission, showing transverse fracture through the body with dislocation inward of the posterior fragment.

(B) X-ray appearance one year after injury. Astragalectomy had been performed, and the end-result was satisfactory.

The methods of treatment employed in our group of fractures of the astragalus and the results obtained are shown in *Table 5*.

Fractures of the Os Calcis.—Fractures of the os calcis are by far the most frequent of the injuries of the tarsal bones. In the Massachusetts General Hospital group of 4,536 injuries they numbered 38, or a little less than 1 per cent of the total. To these I have added 21 cases treated in private practice, making a total of 59 cases available for study. The age distribution of the fractures is shown by the graph (*Fig. 9*), and from this it appears that the injury is peculiarly one of adult life, and probably chiefly related to exposure to industrial hazards. The peak of the incidence is reached between the ages of 40 and 50 years, the period in which the factors of lessened individual agility and decreased resistance of the bone to injury are beginning to be added to that of maximum exposure to industrial risks.

Fracture of the os calcis commonly results from a fall on the feet. This mechanism was

Table 5

FRACTURES OF THE ASTRAGALUS: METHODS OF TREATMENT AND RESULTS

Method of Treatment	Total	Good	Fair	Poor	Unknown
Astragalectomy	4	2	1		1
Open reduction	1			1	
Removal of projecting exostosis	2	1		1	
Fixation in plaster	4	2			2
Bandage or adhesive strapping	5				5
Subastragalar arthrodesis	1	1			
Total	17	6	1	2	8

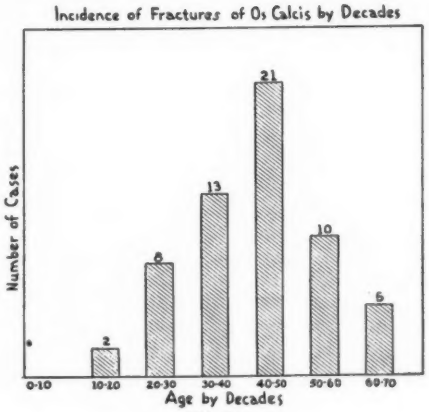


Fig. 9

found to have operated in 52 out of 54 cases in which the character of the trauma was recorded. In the remaining two patients the fracture was produced by lateral compression of the heel. In many instances the distance of the fall did not exceed 4 to 5 feet. Apparently the determining factor is landing heavily on the rigid heel instead of the flexible forefoot.

Table 6

COMPLICATING INJURIES OS CALCIS (59 CASES)
Total Complications in 14 Cases, or 24 Per Cent

	No. of Cases
Fracture internal malleolus and base of fifth metatarsal	1
Patella and tarsal scaphoid	1
Colles' fracture	1
Colles' fracture and rotary dislocation of astragalus	1
Fracture base of neck of femur	1
Fracture patella and astragalus	1
Fracture patella	1
Fractured rib	1
Fracture of head of radius	1
Fracture of olecranon	1
Fracture of ankle	2
Crush fractures of spine	2
Total	14

posterior heel process and fractures of the body. Evulsion fracture of the posterior portion of the os calcis to which the tendo Achillis is attached is the result of muscular violence acting through the gastrocnemius muscle. It is a rare injury and only one example of it was found in our group of 59 cases. This was a horizontal split in the posterior heel process with upward tilting of the superior fragment. The fracture was reduced by open operation and the fragment fixed by the insertion of a beef bone peg (*Fig. 10*). Complete recovery followed in about 4 months.

Fractures of the body of the os calcis may be

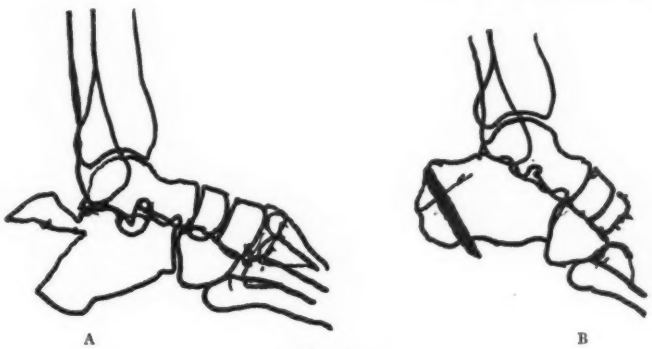


Fig. 10

Evulsion fracture of portion of posterior heel process of os calcis.
(A) Preoperative.
(B) One year after operative reduction and fixation with beef bone peg.

In 5 patients the fracture was bilateral (8.5 per cent) and in only 1 instance was it compound. Complicating fractures were present in 14 patients (24 per cent) and these are shown in *Table 6*. Compression fracture of the spine complicated the injury in only 2 cases, a smaller incidence than is usually expected.

Two general types of fracture of the os calcis can be differentiated: evulsion fractures of the separated into two general classes: crush fractures and fissure fractures. The crush fractures are produced by a fall from a height, and are accompanied by extreme comminution of the bone, and by flattening and spreading. The fissure fractures are also comminuted, but less so than the true crush fractures, and one or two chief fracture lines can be distinguished. These usually take the form of the letter V, with the

limbs extending upward from the plantar surface of the bone and separating to enclose the posterior articular facet of the os calcis. The bone below the outer margin of the facet is comminuted and a portion of the joint surface is depressed or tilted.

The displacement presents three characteristic features which are more marked in the crush fractures than in the fissure fractures (*Fig. 11*). The posterior heel process is displaced upward both as a result of the trauma and of the action of the gastrocnemius muscle. It is also driven forward and shortened. Partly as a result of this and also as a direct effect of the trauma there is lateral protrusion and bulging of the outer surface of the os calcis below the joint surface. The displacement if uncorrected gives rise to several different types of disability. It alters the normal weight-bearing lines of the foot and produces a position of valgus which is bad functionally and likely to be accompanied by weakness, fatigue, and strain. It produces irregularity of the subastragalar joint and damage of the joint cartilage so that there is uneven bearing, joint irritation, restriction of the motions of inversion and eversion, and attendant painful function. It may also give rise to so much bulging of the lateral surface of the os calcis as to lead to impingement against the under surface of the external malleolus with resultant blocking of motion and pain. Finally it may lead to the formation of a bony prominence or exostosis on the plantar surface of the os calcis that may become a point of painful pressure.

Treatment must aim at the prevention or correction of these causes of disability. In the fresh fracture this is to be accomplished by an attempt to correct bony deformity when present.

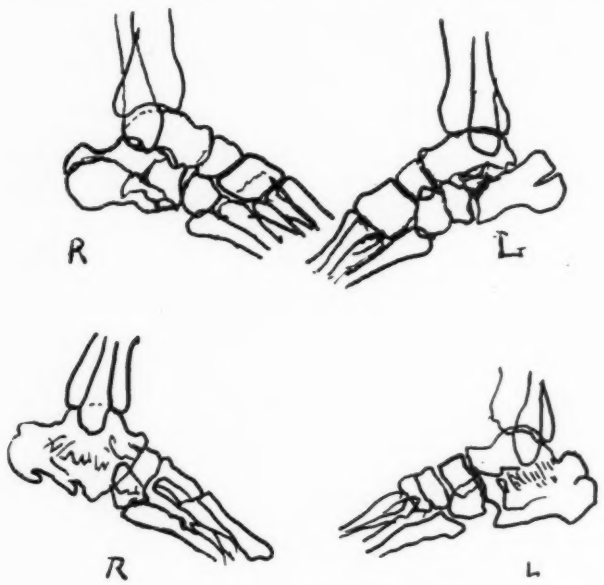


Fig. 11
Crush fracture of both os calces.
Top—X-ray appearance of fracture immediately after injury, showing characteristic displacement.
Bottom—X-ray appearance two years after injury, following subastragalar fusion. Patient was working as elevator man.

The heel process must be drawn backward and downward, and the effort made at the same time to mould back into position the bulging lateral plate of the os calcis, and to reduce the width of the bone to normal. The logical method of doing this is by applying skeletal traction to the heel and exerting a pull backward and downward while at the same time making compression with a suitable clamp upon the body of the os calcis in the transverse diameter. Continuous skeletal traction is dangerous, however, since it involves the insertion of a pin or wire directly in the seat

of fracture and opens a pathway for infection. Severe osteomyelitis developed in one of the 2 patients of our group in whom this method was employed in spite of the fact that the pin was removed at the end of 7 days, and led to a suit for malpractice against the surgeon who was responsible for the treatment. The development of Kirschner's wire of small caliber as a means of securing skeletal traction has reduced this danger, but not entirely eliminated it. When used, it should be for a limited period, not exceeding 10 to 14 days. The other alternative is to apply skeletal traction for manipulative purposes only, and to rely upon fixation in plaster to maintain position. In the latter case the knee should be fixed in flexion and the ankle in plantar flexion in order to secure relaxation of the gastrocnemius muscle and eliminate its deforming action. For correction of the lateral spreading we have employed a carpenter's "C" clamp made of steel which is applied over thick felt pads next to the skin. We believe that this serves as well as the special clamp introduced by Böhler.

I have made extended trial of both of these methods of reduction and have studied the results obtained by other surgeons using the same or different methods. On the whole, I consider the results disappointing. The position of the fragments may be improved, but complete reduction, using the term in the sense in which it is employed in speaking of fractures elsewhere in the body is rarely if ever obtained.

Fracture of the os calcis is notorious as one of the seriously disabling accidents of industry. The heel is called upon to perform heavy duty in the ordinary pursuits of life, and the individual with a painful heel finds it difficult enough to stand or walk, let alone to do heavy laboring work. We have been unable to solve the problem of returning patients with fractures of the os calcis to work by relying wholly upon the so-called reduction methods. In 1923 I began performing the operation of subastragalar fusion in fractures of the os calcis, finding the indications for this procedure in the almost constant involvement of the subastragalar joint by the fracture and in the evidence of painful function of this articulation revealed by examination of patients disabled as a result of this injury. In 1927 I reported the results of this operation in a group of 26 patients, with fractures of the os calcis, and stated that relief of disability had been obtained both in recent and old fractures. Further experience has served to confirm the views expressed at that time, and my conviction is still strong that arthrodesis offers the best remedy in cases of fracture with disruption and permanent damage of the subastragalar joint (*Fig. 12*).

The operation of subastragalar anthrodesis affords the means of attacking the three chief causes of disability in fracture of the os calcis. In addition to eliminating the subastragalar joint as a cause of pain, it also provides the opportunity for correcting the valgus position of the foot by modifying the operation along the lines described by Hoke and others and making use of similar principles to those employed in correcting foot deformities resulting from in-

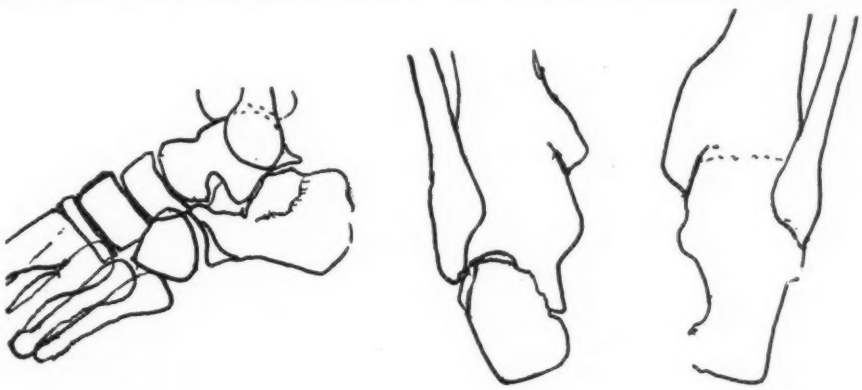


Fig. 12

Old fracture of os calcis.

(A) Lateral view six months after injury, showing irregularity of subastragalar joint, uneven bearing and thinning of joint cartilage.

(B) Plantar view through heels, showing angular deformity and shortening: (a) Injured foot; (b) Normal foot.

fantile paralysis. It also permits the surgical exposure of the lateral surface of the os calcis and the excision of protruding bone in that region when this appears to be a possible source of trouble. The criticism that it sacrifices the lateral motions of the foot seems scarcely justified in view of the fact that irrespective of the method of treatment employed patients scarcely ever recover from this injury with any useful range of lateral movement. Even if this were not the case, the sacrifice of these movements would seem of small moment in comparison with the boons of relief of pain and gain in usefulness of the foot. We hasten to add, however, that this operation is far from a cure-all, that the cases themselves must be carefully selected, and that the operation calls for a high degree of surgical skill of the sort that is gained only by long experience in the correction of foot deformities of all types.

To summarize, our present attitude in respect to the treatment of fractures of the os calcis may be stated as follows:

(1) In recent fractures the attempt should be made to correct bony deformity when present, either by the manipulative method previously described or by continuous skeletal traction with a Kirschner's wire for a period not exceeding two weeks after preliminary moulding of the os calcis.

(2) When the x-ray shows involvement of the subastragalar joint, and the irregularity and distortion of the articular surface persist even after efforts at reduction, then the operation of subastragalar fusion should be performed at the end of about three weeks. Fusion of the midtarsal joints should not be done unless the fracture also involves these joints, or unless this step is necessary for the correction of faulty weight-bearing position of the foot.

(3) When there is doubt as to the amount of disturbance of the subastragalar joint the best course is to wait and see whether the patient may recover without operation. It is to be remembered, however, that the results of early fusion operations are better than those following late operations.

(4) In the case of the persistently disabled patients who are first seen several months after injury, and who show on examination limitation of the motions of inversion and eversion and pain on forced inversion, and who present x-ray evidence of joint irregularity, subastragalar arthrodesis should be performed together with removal of the heaped up bone on the lateral surface of the os calcis and operative correction of faulty weight-bearing position of the foot.

(5) In the case of recent fractures with slight or no bony deformity, or in which there is absence of irregularity of the subastragalar joint the injury should be treated by fixation in plaster after such manipulative treatment as may be indicated. Fixation should be maintained for 8 weeks, but weight-bearing may be permitted during this period with the aid of a steel walking stirrup.

The methods of treatment employed in this group of 59 patients with 64 fractures of the os calcis, together with the end-results so far as they are known a year or more after injury, are shown in *Table 7*. Forty patients, of whom 4 had bilateral fractures, were treated by subastragalar arthrodesis. Of these 15 were patients with fresh fractures and the remainder were subjected to operation at periods varying from 6 weeks to 5 years after injury. End-results are known in 33 of these 40 patients. They were good in 24, of which 2 had bilateral fractures, and all of these patients had returned to work, chiefly to occupations involving heavy labor. They were fair in 6, meaning that they were capable of doing some type of work, although not able to return to their former active occupations. Three of the results were considered poor. One of these patients had developed thrombo-angiitis obliterans, but complained of his opposite leg and not of the injured foot. Another had a stiff, sensitive foot, which was thought to be due to an arthritic complication. The third had a severe crush fracture with gross deformity which it had been impossible to correct. He was better as a result of operation, but was still totally disabled when last seen. In none of these patients was there any instance of failure to obtain bony fusion. Two of the patients had had the operation of subastragalar arthrodesis performed upon their feet before coming under our care, and in both cases there was absence of ankylosis and persistence of pain. Complete relief was obtained after the second operation.

The 9 house patients who were treated without arthrodesis were cases in which there was absence of involvement of the subastragalar joint or in which operation could not be performed because of other complicating injuries. Of the 5 in which end-result notes were obtained, 2 were graded good, 2 fair and 1 poor. The latter patient had developed osteomyelitis of the os calcis, and in addition had an unreduced subastragalar dislocation. Both of the patients

Table 7

RESULTS OF TREATMENT OF FRACTURES OF THE OS CALCIS (59 CONSECUTIVE CASES)

Methods of Treatment	Total	Good	Fair	Poor	Unknown
House Cases—Number, 32					
Plaster fixation without manipulation	7	1	2		4
Continuous skeletal traction	2	1		1	
Subastragalar arthrodesis	40	24	6	3	7
Operative narrowing of os calcis	2	2			
Open reduction of evulsion fracture	1	1			
Removal of plantar exostosis	1	1			
Emergency Ward Cases—Number, 6					
Plaster fixation	4				4
Adhesive strapping	1				1
Refused treatment	1				1
Total	59	30	8	4	17

whose results were graded fair showed evidence of disturbed function of the subastragalar joint at the time of examination and would have been better off if a fusion operation had been performed. Two patients underwent operations for the removal of new bone impinging under the external malleolus, and both obtained good results, and were enabled to return to their former occupations. One patient underwent operation 4 months after injury for the removal of a large bony prominence on the inferior aspect of the os calcis which caused painful pressure, and returned to work as an elevator man 10 months after operation. Open reduction for an evulsion fracture of a portion of the posterior heel process was performed in 1 patient, and she was able to resume her usual household duties at the end of 4 months.

SUMMARY

Fractures and dislocations of the tarsal bones include a variety of injuries which are uniformly disabling if improperly treated. We believe that the keynote to a successful solution of the problems presented by these injuries is, first, accurate and early diagnosis; second, reduction of bony deformity when possible; and third, the recognition of irreparable damage when it exists, and the treatment of this according to the orthopedic principles of arthrodesis in case of the involvement of one of the tarsal articulations and of astragalectomy properly performed when preservation of the astragalus is no longer advisable.

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PRELIMINARY SKELETAL TRACTION IN THE TREATMENT OF CONGENITAL DISLOCATION OF THE HIP*

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The primary object of treatment in congenital dislocation of the hip is to place the head of the femur in proper anatomical relation with the acetabulum, then hold it in this position for a sufficient length of time to prevent future subluxation or dislocation, and at the same time to retain normal painless motion of the joint.

In theory it would seem that any dislocated hip could thus be reduced, but practically this is far from true. Even in very young individuals, there are certain definite obstacles to successful and permanent reduction which are difficult to overcome. These obstacles become more and more difficult to surmount as the child grows older. In consequence the hope for complete restoration of normal function becomes less and less as age increases.

These obstacles to successful reduction are both developmental and mechanical in nature. The developmental changes which are present in the acetabulum and in the head of the femur are factors over which we have very little direct control. Even though reduction at a very early age is said to influence favorably the future development of these structures, we certainly cannot hope to change the marked defects that have occurred in the older untreated patients. Obviously, then, even if it is possible to place the femoral head in the acetabulum, the more marked the developmental changes, the less likely are we to obtain normal joint function after reduction.

The mechanical obstacles to reduction are, however, well within our direct control and it is the chief concern of this paper to discuss a simple yet effective means of overcoming the mechanical hindrances which prevent easy traumaless placement of the femoral head into the acetabulum. I refer to the use of skeletal traction.

Preliminary skeletal traction in certain cases of congenital dislocation of the hip is not a new procedure. Abbott,[1] in 1921, made use of Steinman pin traction in the treatment of dis-

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location in older children. Allison[2] described a similar method for use in young adults and Dickson[3] has employed skeletal traction preliminary to his shelf operation. However, I have been unable to find any reference in the literature relative to the use of skeletal traction in the treatment of dislocations of the hip in the younger age groups as a preliminary procedure to either open or closed reduction. Perhaps skeletal traction has been regarded as too radical a procedure in the younger children. On first thought this attitude would seem justified, but on careful analysis, skeletal traction is far less radical than the usual classical procedure of forcible stretching and massaging of those structures which hinder successful manipulative reduction. No matter how gentle we may try to be in the preliminary stretching of the soft parts, it is most unreasonable to assume that structurally shortened muscles, tendons, ligaments, nerves, vessels and capsule can be stretched and relaxed by force under an anesthetic in 20 to 30 minutes without producing considerable damage to the tissues involved. On the other hand, if these soft parts are not thoroughly relaxed, the actual reduction itself must of necessity be effected through exertion of considerable force, and in consequence the already under-developed head of the femur is further damaged.

The occurrence of such serious complications as paralysis of the sciatic nerve, rupture of important vessels, tearing of muscles, fracture of the femur, or avulsion of the head of the femur, has been all too frequent even in the hands of experienced surgeons. If, then, the mechanical obstacles which hinder reduction can be gradually stretched and relaxed by preliminary skeletal traction, the actual placement of the head of the femur into the acetabulum can be accomplished with a minimum of trauma and with the avoidance of the aforementioned complications.

It is granted that in a limited number of cases under four or five years of age, the head can be pulled down with skin traction, but in the majority of instances, even in cases as young as this, adhesive traction will not suffice. Only rarely in patients over five years of age is it possible to add sufficient weight with adhesive traction to pull the head of the femur down opposite the acetabulum. It is necessary, therefore, to apply skeletal traction if subsequent reduction is to be accomplished without force. Until recently, the only means of obtaining skeletal traction has been either through the agency of calipers or by some modification of the Steinman pin. The use of calipers in growing children cannot be too severely criticised and their use is fraught with serious danger. A Steinman pin of sufficient strength to resist bending is too large in diameter to drill through the shaft of the femur in very young children. However, now that wire traction has become popular and has proven simple to use, skeletal traction can be safely applied in patients as young as two or three years of age. Therefore, the preliminary skeletal traction which has proven of real value for a number of years in the older age groups may now be employed when necessary in all age groups.

For purposes of description, the cases in which skeletal traction has been used to advantage may be divided into three main groups.

(1) Children in whom closed manipulative reduction can be successfully effected.

(2) Children in whom open reductions are indicated.

(3) Children over ten years of age with unilateral dislocation in whom arthrodesis offers the best result.

CLOSED REDUCTION GROUP

It is entirely without the scope of this discussion to enter into the controversy over the relative merits of open and closed reduction in the treatment of congenital dislocation of the hip. This much, however, may be said. There is an increasing dissatisfaction in a number of clinics, including our own, with the end-results of manipulative reductions. A certain number of cases thus treated come back later with redislocations, others come back with anterior transpositions, still others never regain satisfactory motion, and even in those whose hips have remained reduced with preservation of excellent painless joint motion, the x-ray almost invariably shows very striking changes in the head of the femur and the acetabulum which make one wonder how joint motion is at all possible (*Fig. 1*).

In all probability the redislocations are due to developmental defects in the acetabulum, but in every case with redislocation in which we have subsequently done an open operation there has been a double layer of capsule between the head and acetabulum and we strongly suspect that this is also a factor in the causation of redislocation. Open reduction, of course, eliminates this occurrence and at the same time permits reconstruction of the inadequate acetabular roof.

The anterior transposition following reduction is always due to antetorsion of the neck of the femur and unless due measures are taken to

Fig. 1

L. Z., female, aged 14 years. X-ray taken 8 years after closed reduction. Note marked deformity of acetabulum and femoral head. Patient has free painless motion in spite of the marked joint changes.

correct this torsion, it will occur just as often in open as in closed reductions and consequently cannot be used as an argument against closed reduction.

Whether or not the striking late x-ray changes seen in the joint itself after successful closed reduction can be prevented by open operation is a question that permits of no answer until the true end-results of operative reduction can be evaluated. It is entirely possible that the trauma incident to forcible closed reduction may account at least in part for these bony changes. If by chance this might be true, then preliminary skeletal traction, which practically eliminates the trauma incident to closed reduction, should prove of great value.

To date we have used skeletal traction in ten cases of closed reduction. The youngest patient was two and one-half years of age (*Fig. 2*), the oldest eight years (*Fig. 3*). In four cases, reduction occurred spontaneously (*Fig. 4*), while traction was still in place and in the others it required practically no force to manipulate the hips in place with the patient under a light anesthetic. In the average case of from two to five years of age, 15 to 20 pounds of skeletal traction over a period of seven to ten days is sufficient. In the older children, six to ten years of age, 30 or 40 pounds over a period of two to three weeks are required to adequately pull the head down opposite the acetabulum. We believe that closed reduction, preceded by skeletal traction, should be tried in all patients under seven years, provided the x-ray shows the presence of a well-formed acetabulum with an adequate upper rim. If, however, manipulative reduction cannot be accomplished without the use of considerable force, we feel that an open reduction should be done.

OPEN REDUCTION

In those cases in whom we are certain the acetabulum is too shallow and its roof too vertical to hope for permanent reduction after closed manipulation, and in those cases in whom closed reduction cannot be effected without undue trauma, open reduction preceded by preliminary skeletal traction is indicated. Here again, if reduction is attempted without first pulling the head of the femur down opposite the acetabulum, radical cutting of resistant soft parts must be done before the head can be forced in joint and in a number of instances even after all resistant structures have been divided, the head cannot be placed in the acetabulum without the use of considerable force. Even under ideal conditions, open operation in young children is a severe test of their endurance and any procedure which eliminates the necessity for radical cutting of soft parts and the necessity for the use of force to place the head in the acetabulum, should be a distinct advantage. The group of cases treated by preliminary skeletal traction and open operation includes 13 pa-

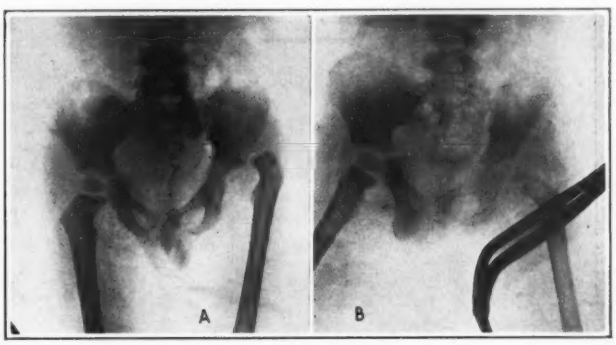

Fig. 2

J. M., male, aged 29 months. Congenital dislocation of the hip. One and one-half inches of shortening. A. Before treatment. B. Fourteen days after sixteen pounds of skeletal traction (wire). Closed reduction was effected without anesthetic.

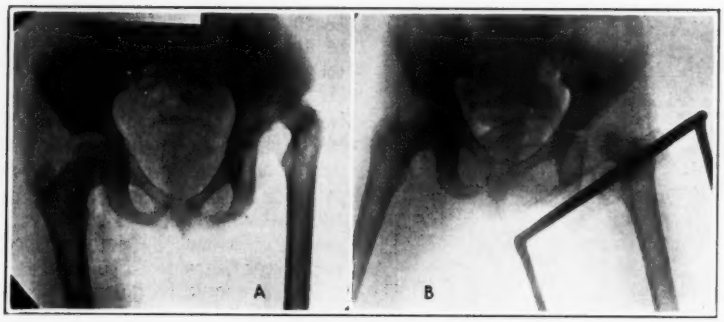

Fig. 3

W. K., female, aged 8 years. Congenital dislocation of the hip. Two inches of shortening, marked limp, but no pain. A. Before treatment. B. Three weeks after application of thirty pounds skeletal traction. (Hip subsequently reduced by closed manipulation under light anesthesia without force.)

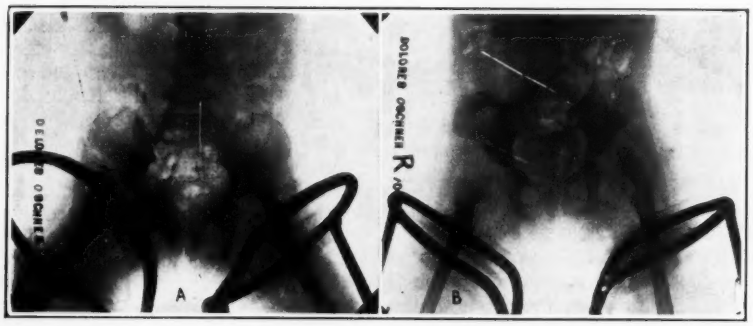

Fig. 4

D. O., female, aged 31 months. Bilateral congenital dislocation of the hip. A. One week after application of wire traction. B. Three weeks after fifteen pounds traction on each hip. Right hip reduced itself spontaneously.

Fig. 5

J. W., female, aged 6 years. Unilateral dislocation with inadequate acetabulum. A. Before treatment. Note shallow acetabulum with vertical roof. B. Six days after thirty pounds wire traction. C. One month after open reduction and shelf operation. At the time of operation the hip was found to be reduced, but with a double layer of capsule between the head and acetabulum. The shelf is extracapsular.

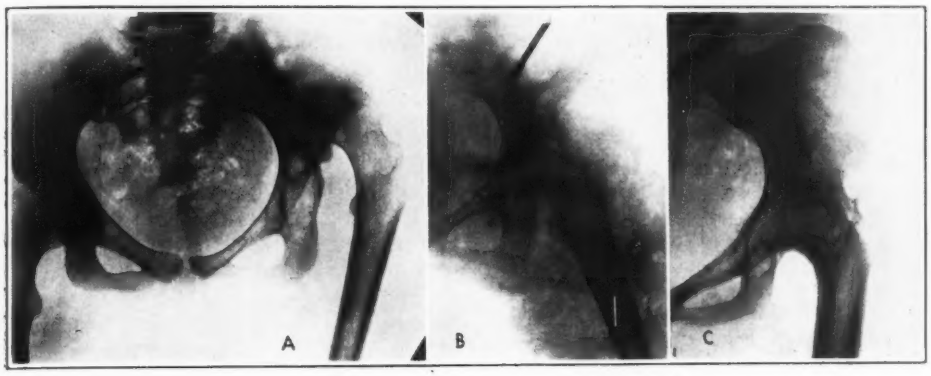

Fig. 6

L. M., female, aged 14 years. Unilateral dislocation. Two and one-half inches of shortening. Pain was the chief complaint. A. Before treatment. B. X-ray taken immediately after interarticular arthrodesis. It required fifty pounds of skeletal traction applied over a period of four weeks to pull the head down opposite the acetabulum. C. Seven years after arthrodesis with the hip in 25° flexion, 3° abduction, and slight external rotation. Patient absolutely free of pain.

tients and 17 operations. The youngest patient was four years and the oldest was eight. In the majority of patients below the age of five years, open reduction was done primarily because of an insufficient acetabulum and in those cases a shelf operation[4] was performed (*Fig. 5*). In the cases above five years, open operation was resorted to because closed reduction could not be effected without undue force even after adequate preliminary skeletal traction. Here again a shelf was turned down when the acetabular roof seemed inadequate. As yet, the end-results cannot be evaluated except insofar as all the dislocations have remained reduced and all of the patients have stable painless hips with good motion. No gross changes in the x-ray appearance of the joints have been noted. Whether these joints will eventually show the same changes seen in cases treated without preliminary traction is mere conjecture. At least the preliminary traction has eliminated trauma to the head as an etiological factor.

UNILATERAL DISLOCATION IN OLDER CHILDREN

Sooner or later every untreated dislocation of the hip reaches the stage when reduction with motion is impossible. Although reduction might be accomplished mechanically, the developmental and structural changes in the head of the femur and acetabulum are such that joint function cannot be restored. As a rule, attempts at reduction by operation in children over ten usually end in failure to secure joint motion, and fibrous ankylosis with the hip in flexion, and adduction ensues. In this group of cases we must either let the hips go untreated, thereby leaving the patient with the outlook of serious future disability in addition to his already unsatisfactory gait, or else offer him the alternative of turning down a shelf over the head of the femur or an intra-articular arthrodesis.

The shelf operation will give stability and motion, and if preceded by skeletal traction, will overcome a certain amount of shortening, but it has not been proven beyond all doubt that it will prevent the occurrence of late traumatic arthritis with its attendant pain.

Dickson[5] has reported good results in the shelf operation done by his method and he states "the

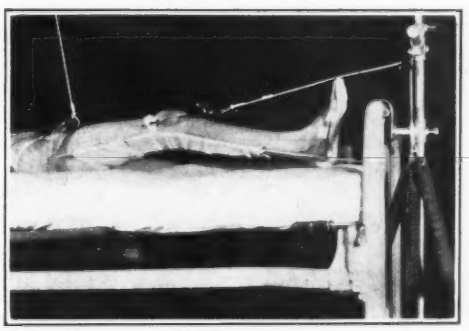

Fig. 7

Showing method of applying skeletal traction with a Steinman pin. Wire traction is used in exactly the same manner except a wire traction bow is used instead of a Steinman stirrup.

results of shelf operation so far as we can determine have been lasting." His longest end-results are twelve years and the patients are leading active lives without symptoms or interference with active use of the hip.

Intra-articular arthrodesis in good functional position for weight-bearing, on the other hand, will overcome the shortening, will markedly improve the gait, will completely stabilize the hip and will eliminate entirely any chance of future disability due to pain. It is in this type of case that preliminary skeletal traction is absolutely essential (*Fig. 6*), for even after radical and extensive division of soft parts, it is impossible to apply enough force at the time of operation to lever the head into the acetabulum. If, however, skeletal traction is used as a preliminary procedure, the arthrodesis may be performed with a minimum of effort. In the older cases it is often necessary to tenotomize the adductors and hip flexors at the time skeletal traction is applied, and even then 50 or 60 pounds are required over a three or four week period before the head can be brought down into a suitable position to make intra-articular arthrodesis possible.

In this group we have treated 12 cases. The youngest was eight years, the oldest was eighteen years. The average time of traction was three weeks, the longest five weeks. The maximum weight required was 70 pounds in a 110-pound girl eighteen years of age. The average time for solid ankylosis was three months, the longest time before ankylosis occurred was six months. Following the findings of Adams,[6] who pointed out convincingly the best functional position for a stiff hip, we have placed these hips in 30 degrees flexion, a slight amount of external rotation and wherever possible, in the neutral position as far as adduction and abduction are concerned; but we have varied abduction and adduction so that all cases were left with three-fourths to one inch apparent shortening. The longest period of observation in this type of case has been eight years in a girl now twenty-two years of age (*Fig. 7*).

The one serious objection, of course, to arthrodesis is the fact that the patients have no motion whatever and it is sincerely to be hoped that in the not far distant future the public and profession will recognize that practically all patients under the age of three years can be cured completely. When this occurs, the many operations devised for treatment of neglected cases of congenital dislocation of the hip will fall into the discard.

SUMMARY

(1) The use of skeletal traction as a preliminary procedure in the treatment of congenital dislocation of the hip is again brought to the attention of the profession.

(2) This method of treatment has been used to advantage for a number of years in the older age groups.

(3) By the use of wire instead of the usual Steinman pin the method can be employed in all age groups.

(4) Even in young children, the use of preliminary wire traction is of distinct advantage in that it gradually overcomes resistant soft parts and thereby prevents serious damage to muscles, ligaments, nerves and vessels and trauma to the femoral head.

(5) In open reduction preliminary skeletal traction definitely reduces the incidence of shock by shortening the time of operation, eliminating radical division of soft parts and obviating the use of force in effecting the placement of the head into the acetabulum.

(6) In the older age groups, skeletal traction greatly simplifies any of the various operative procedures now in use.

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DISCUSSION (*Abstract*)

Dr. J. Albert Key, St. Louis, Mo.—Dr. Crego deserves a good deal of credit for extending the use of preliminary skeletal traction to the younger children with congenital dislocation at the hip. In the past we have used the method only when we believed that we should not be able to obtain reduction without it. In the future we shall use it in order to render the manipulative reduction less traumatising and in order to avoid injury to the head of the femur. In this sense the preliminary skeletal traction may be regarded as a more conservative method than the apparently

simple, but really violent, reduction of the dislocation by manipulation.

Dr. J. W. White, Greenville, S. C.—Skeletal traction is an excellent method to save the head of the femur preparatory to reduction in the more difficult cases.

Dr. J. H. Kite, Decatur, Ga.—Dr. Crego has very convincingly demonstrated the value of preliminary traction in the reduction of congenital dislocation of the hip. In the last ten years at the Scottish Rite Hospital, no attempt has been made to reduce a single case of congenital dislocation of the hip, without first applying traction. The traction not only makes the reduction easier, but greatly reduces the trauma to the head of the femur. We have successfully reduced every case in a patient under the age of eight, after the use of preliminary traction. We have found that the most satisfactory method of making traction is by means of the plaster traction apparatus devised by Dr. Hoke. This consists of a plaster spica applied to the normal leg with a metal traction apparatus incorporated on the side of the dislocated hip. Traction is made by means of adhesive on the skin of the dislocated leg. Within a week the dislocated head can be pulled down opposite the acetabulum. We have never found it necessary to use a pin or wire. This method requires no anesthetic, involves no risk of infection, and causes the patient a minimum amount of discomfort. The method by which the traction is applied, however, is a matter of detail and personal choice; the important principle brought to our attention by this paper is the value of preliminary traction, which renders the reduction easier and more certain, and enables the reduction to be accomplished with little trauma to the head of the femur.

Dr. J. R. Bost, Houston, Tex.—For about ten years it has been my practice to use preliminary traction on all patients with congenital dislocation of the hip upon whom I intended doing open reduction. After hearing Dr. Crego's paper I feel that my results might have been more satisfactory had skeletal traction been used. In unilateral dislocations I have used the method of plaster traction devised by Dr. Michael Hoke. I have never found it necessary to do an arthrodesis in congenital dislocation of the hip though it is conceivable that this procedure would be advisable in certain selected cases. Ankylosis occurred in two patients upon whom I had performed open operations for reduction of unilateral dislocation. It was my opinion at the time that fixation had been maintained over too long a period. Notwithstanding the fact that both of these patients were very well pleased with the final results, I felt that better results could have been obtained.

Dr. Barney Brooks, Nashville, Tenn.—Skeletal traction is a valuable method to be employed in the presence of certain conditions. This peculiar set of conditions is not frequently encountered, but would seem to be present in the instances of congenital dislocation of the hip described by Dr. Crego.

Dr. Crego (closing).—I do not advocate skeletal traction in all cases of congenital dislocation of the hip, but do maintain that some form of traction should be used as a preliminary to reduction in every case, reserving skeletal traction for those cases in which adhesive traction is insufficient.

CUTANEOUS TORULOSIS

THE IDENTIFICATION OF YEAST CELLS IN GENERAL IN HISTOLOGIC SECTIONS*†

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The genus Torula is a badly defined one, particularly in its medical application, and necessitates such extended review of botanic and other premises that its exact status cannot be defined in a communication of this sort. Suffice it to say that it is a yeast, that Torula is practically synonymous with Cryptococcus as conceived in American medicine, but that "Torula" has become too deeply anchored by usage in our medical nomenclature to be replaced.

Torulosis of internal organs, particularly of the brain and cord, is a well-known entity which has recently received monographic treatment (covering 43 cases) and has been brought down to date by Freeman.[1] The cutaneous aspects have received little attention, not only because the visceral ones overshadowed them, but because cutaneous involvement was not extensive or frequently met. However, there is by now sufficient evidence to indicate that the clinical dermatology will be found distinctive, just as the specific micro-organisms and histopathology already are, when enough cases have been accumulated to chart the symptomatology. Hence it appears that the time has arrived to recognize the existence of cutaneous lesions caused by Torula, identify the disease as an entity, and denominate it "cutaneous torulosis." In the broad sense the disease is a form of blastomycosis and possibly is identical with the "European blastomycosis" of Busse-Buschke; but it is radically different from our American blastomycosis (Gilchrist's disease) in all other respects—in etiology, morbid anatomy, and prognosis.

The second phase of this paper has to do with the diagnosis of those yeast infections in general which induce specific granulomas; it requires considerable explanation and entails some digression. It is permissible to use Torula as the text for this subject because, whereas the lesion induced is not highly inflammatory, that is, the micro-organism provokes singularly little tissue reaction, there is still sufficient to bring

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it into the group of specific granulomas. This at once arouses the interest of the dermatologist because it bears obviously on certain problems in diagnosis with which he has been confronted. It is common knowledge, for example, that indolent, subacute granulomatous states occur only too often in the skin which do not conform to the picture of tuberculosis, syphilis, the commoner fungus infections, and similar diseases which are characterized by this type of reaction and which frequntly raise difficult diagnostic problems. They are commonly entitled "granulomas of undetermined nature."

Generally such cases enjoy the most thorough and expert thought from the clinical side, but the attention is not matched from the laboratory angle. It is true that a routine examination of material from biopsy and Wassermann or other serologic tests may be added to the stock of information and render distinct service. Cultures, too, both bacteriologic and mycologic, may be made, particularly in those cases where pus is present. The usefulness of these cultural studies, however, is greatly handicapped because many micro-organisms are uncharted as they occur in the skin, and because pathologists at large are not highly qualified in the mycologic and dermatologic fields to identify and appraise them etiologically. We need, in America, a more intensive study (including the arrangement of such an elementary thing as a catalog), of not alone the mycology, but the bacteriology of indolent cutaneous lesions. *Bacillus myceticus* of Castellani is in point; *Bacillus pyocyaneus* is an additional one. Its deeply seated, indolent, slaty nodules may suggest the bruise-like infiltration of erythema nodosum save for their scattering distribution.

All of these perhaps extended remarks are in order in this place because cutaneous torulosis, I am confident, would fall into the "granulomas of undetermined nature" were it met solely as a clinical dermatologic phenomenon, and (this is the phase of these remarks that merits special emphasis) *because the way is now open to apply certain laboratory tests for its diagnosis which should preferably be "mycologic," which, when successful, are pathognomonic for the micro-organism in the case.* Thus, in the case of Torula, the appropriate "mycologic" tests bring out such clear-cut appearances that they are pathognomonic to a degree; the micro-organism ranks with *Bacillus tuberculosis* and *Treponema pallidum* in distinctiveness, and would be a most refreshing finding in the pursuit of the diagnosis of any instance of granuloma of undetermined nature.

My attention was first attracted to torulosis (as it affects the skin) in connection with what was essentially a cerebrospinal form of blastomycosis when I reported, with Freeman[2] a case at necropsy in 1923. Our subject did not exhibit cutaneous lesions, but the survey of literature showed that the skin (of the forehead)* had once been involved. This was the solitary instance of cutaneous invasion which we found at that time. Incidentally, skilled dermatological attention had not been given to the case, and the report was entirely inadequate to give any dermatologist an intelligent idea of the appearance of the lesions, particularly as it would have been conducive to differential diagnosis from other granulomas of undetermined nature. Fortunately, Urbach and Zach[3] (in 1930) subsequently laid the first stone in the establishment of the clinical complex of this entity.

With the causative micro-organism, however, we have had a rather full experience. Freeman and I have since collected twenty strains of *Torula histolytica* and have been studying and comparing them in some detail in the last three years. Naturally this familiarity with the micro-organism prompted curiosity as to the effects it would produce in the skin, and all that was necessary at this juncture was the intervention of our good colleague, Dr. Marion S. Fitchett, of Norfolk, Virginia, to precipitate the animal tests I am reporting herewith. Dr. Fitchett very kindly forwarded autopsy material from a case of generalized Torulosis (but not of the skin) including a culture which I identified as *Torula histolytica.* It seemed quite appropriate thereafter that I should use his Southern strain for prying into the finer dermatology of this doubtless rare affection of the skin and make the results available to dermatologists for use in future cases, if, as, and when they should arise. The order of events in the study of cutaneous torulosis is thus unusual in the history of dermatoses in that the experimental morbid anatomy and other laboratory phases preceded the refined clinical dermatology.

The second phase of this communication pertains to laboratory technic in respect to Torula. There are certain important differences between bacteriologic and mycologic technic, a knowledge of whose peculiarities will facilitate the detection of Torula in the skin, and without which its presence might be overlooked. Ac-

*Rappaport and Kaplan, loc. cit.

tually, this has been the experience with some of the visceral cases of torulosis. In any event, I shall aim to put data at the disposal of dermatologists whereby they may have fuller advantages in the way of laboratory technic and be in a position to inquire yet further into the mysteries of granulomas and ulcers of undetermined nature. In the case of cutaneous torulosis they should be enabled to appear in that most desirable light wherein they may some day help to clear up the diagnosis of an important internal medical state.

In short, this communication will aim (1) to indicate some of the clinical features of cutaneous torulosis both as induced upon an experimental monkey and recorded in the literature for man. These have never been adequately collected and described, and my own experience admittedly adds little. (2) It will record in some detail the gross and microscopic anatomy; (3) it will indicate briefly the characteristics of *Torula histolytica* in culture; and (4) point out certain peculiarities in the technic of the mycological study of this disease which may facilitate its diagnosis dermatologically.

CLINICAL ASPECTS

Up to the time of Freeman's monograph it appeared that there had been but two instances of authenticated cutaneous involvement by Torula in man, to which he added (page 322) that Milstead had found miliaria at necropsy, and Wildman a generalized exfoliative dermatitis with loss of all hair and nails. The last two cases are unreported in the literature. To these it is now possible to add Mook's personal communication and the comprehensively described case of Urbach and Zach. The latter is the most valuable report of cutaneous torulosis on record. McGehee and Michelson's case in which a deep seated focus eventually presented upon the skin may possibly be accepted as dermatologic. Dr. Carl V. Weller has personally demonstrated to me a necropsy case in which the cutaneous lesions were the ones which first brought the patient under medical observation. It will be reported in detail at a future date.

It thus appears that there have been to date but five or six authenticated instances of cutaneous torulosis.* Evidently the skin is a decidedly uncommon and perhaps unfavorable habitat for the parasite as we know it today.

Rappaport and Kaplan's[4] *Case.*—The clinical report was embodied in a single paragraph. There was an acneiform lesion on the forehead, first observed while the patient was under observation in the hospital. Although the time factors of the case were not clearly recorded, the cutaneous features apparently did not occur until late in the entire disease process, and but a few weeks before death. It was stated that the lesion must have been present for some time, but on account of its close resemblance to the ordinary acne papule it had not received particular attention. It was a pointed, indurated papule with a crusted surface. When the crust was removed there was a depression about 3 mm. deep with a clean base. The lesion was freely movable over the frontal bone. It did not enlarge during the rest of the disease course. Cultures of Torula were isolated. There were not any other skin lesions except decubitus.

The necropsy, performed by Davis, a competent pathologist, did not supply any additional features for the skin except that the lesion was large (1 cm. in diameter) and had prominent margins. There was tuberculosis in both lungs, as well as widespread torulosis of internal organs.

Histologically the lesion was found to be located in the deeper parts of the corium. The micro-organisms were present in enormous numbers; only one or two were found in the epiderm. The tissue reaction in the periphery of the yeast cell masses was chronic in type. Cells resembling epithelioids were found surrounding some of the micro-organisms. The authors emphasized that the picture was not like that of Gilchrist's disease; there were not any abscesses or giant cells. It was a distinctive kind of skin lesion.

Verse's[5] *Case.*—This was likewise described with the utmost brevity insofar as the skin was concerned. Late in the course of the disease an acneiform eruption appeared which developed into "sores" (Geschwür). This comprised the entire dermatologic report. The cutaneous lesions were not examined microscopically, although a necropsy was performed and the spleen, kidneys, meninges and other viscera were found affected by torulosis. Since there was an old residual tuberculosis of lungs and pleura (tuberculosis was also associated in the preceding case) the possibility that the eruption was a tuberculid cannot be excluded.

McGehee and Michelson's[6] *Case.*—While not clearly cutaneous, this case deserves recording here because the lesion was apparently local and presented at least (like an abscess) upon the skin. A negress, aged twenty-six, came under surgical observation first on account of an abscess in the inguinal region and a vaginal discharge. The infection originated four months previously in the pelvis, burrowing into its subcutaneous position through Hunter's canal. The symptoms were subacute at first, but upon the appearance of the inguinal abscess (sixteen days' duration) they became acute, with fever, hyperpyrexia (101°) and leucocytosis (15,000 to 24,000). Apparently there was not an associated cerebrospinal or other visceral infection. Evacuation of the inguinal lesion also drained the pelvic abscess, with complete recovery (continuing for at least one year subsequently) in seventy-five days after a somewhat stormy course (temperature 105°). Iodides were administered both orally and intravenously. Lab-

*The cases of Torula infection described by Jeanselme et al,[11] Tomtchuk, Alatorzeff[10] and by Langeron have not any bearing on the torulosis herewith described. The micro-organisms referred to produced mycelium or even black grains as in mycetoma. The confusion thus engendered is due to the different systems of fungus classification adopted by American and some Continental workers; the proper sense of the genus Torula has not been agreed upon.

oratory studies were careful, thorough and reliable, including classification of the micro-organism, histological sections, and animal inoculations.

There were several unusual features in this case. (1) It was local; only one other case, of the vertebral muscles, is recorded; (2) symptoms were highly toxic, but might have been due to a penumonitis in view of the cough and expectoration which entered as a complication; (3) the pus was creamy, not gelatinous as would be expected.

Assuming that this patient was truly free of visceral involvement, the lesson taught here is that torulosis may remain localized, in which case recovery may be expected. This is important and reasonable to believe if we can conceive that cutaneous torulosis likewise could remain localized.

Mook's Case.—In discussion of my presentation of a monkey with experimental torulosis at the meeting of the Atlantic Dermatologic Conference (November 11, 1932) Mook reported that he had seen a small granulomatous lesion on the sole of a patient seen in consultation with a neurologist in St. Louis. It was conical and crusted. At that time the diagnosis was an infectious granuloma, but its precise nature was indeterminate. Subsequently, however, following a surgical operation, Torulae were identified in the cutaneous lesion.[14]

Urbach and Zach's[3] *Case.*—This carried a particular message to the dermatologist because the first lesion observed occurred in the mouth. A man of 27 exhibited granulation tissue on the lower alveolar margin. Six months later it spread to the upper jaw. One year after onset abscesses developed on the left side of the abdomen, thigh, and neck. The surgeon evacuated 200 c. c. of pus, following which a pneumonia developed. A roentgenogram of the lungs showed an inflammatory thickening of the hilus. It is possible that this was caused by Torula, inasmuch as the lungs were subsequently found involved by the yeast at necropsy.

The patient came under dermatologic observation for the first time eighteen months after the onset of the disease. The entire upper alveolar margin anteriorly was covered by granulation tissue, soft, dark violet, and well marginated. The lower gum was normal. Secretion could not be squeezed out, due perhaps to the fact that x-ray treatment had been applied. There were firm, enlarged, indolent lymph nodes at the left angle of the jaw.

As to the skin, there were in the main four phenomena:

(1) A firm, violet nodule the size of a lentil on the left cheek at first mistaken for a nevus. Since it increased in size it was removed surgically.

(2) Under the chin there was another large nodule, firm and elastic in consistency. It became covered by a crust after incising.

(3) Under the left breast there was a lesion 1 by 1.5 cm. The center was depressed and the margins were elevated. There was a violet areola, but the lesion itself was red-brown. It was not adherent to underlying parts.

(4) At the middle of the thigh over the sartorius there was an ulcer 2 cm. in diameter with a violet-blue periphery. The central ulceration was deep, filled by a thin secretion intermixed with yellow granules.

Further Course of Disease.—Following injections of yeast vaccine the skin lesions regressed, but those of the gums remained stationary. Yeast cells were now recovered microscopically and by culture in the sputum and the pulmonary disease was found to have progressed, as determined by radiogram. Iodides were administered intravenously with improvement in subjective symptoms of such a degree that the patient was discharged to the out-patient department.

Two years after the onset of the disease general symptoms intervened; evening temperature, marked expectoration, and the patient became hard of hearing. By this time the involvement had extended to the nasal septum, to the hard and soft palate, and the pharynx. These were tumid and violaceous. The lesions of the gums were much worse. All of the skin lesions had become enlarged and brown-violet, but there was not any regional adenopathy.

All the skin lesions were excised surgically; the ones on the thigh were found to extend as deep as the muscle. Again intravenous iodine therapy made the patient feel better, but nevertheless the lesions were progressive. Yeast cells were now cultured from the urine.

Headache, the first sign of nervous system involvement met with in this case, occurred two years after the onset of the disease; yeast cells were now demonstrated microscopically and by culture from the spinal fluid. Marked disturbance of the eye muscles and clonic convulsions closed the case.

The necropsy was performed by Chiari, who found extensive Torula infection of the lungs, kidney, lymph nodes, stomach and intestines as well as yeast cell involvement of the postoperative scar on the thigh.

TENTATIVE STATEMENT (SYNOPSIS) OF SYMPTOMATOLOGY OF CUTANEOUS TORULOSIS

(1) Cutaneous torulosis is rare. Apparently but 4 or 5 cases have been recorded.

(2) All are associated sooner or later with cerebrospinal torulosis; to this a widespread general torulosis may be added.

(3) Neurologic symptoms usually precede the development of skin lesions. Urbach's case was the exception, in which the primary lesion occurred on the gums and extended to the mouth.

(4) The mucous membrane of the mouth and pharynx is the most common primary portal of entry to the body. Generally the lesion is not recognized here, is probably non-existent. Again, Urbach and Zach's case was the exception.

(5) The anatomic distribution cannot be stated at present. It is probable that the cutaneous distribution is not a uniform one and the lesions can occur more or less widely and sparingly scattered as in furunculosis.

(6) The lesion is a granuloma which develops so rapidly that it simulates abscess formation

(fourteen days). Absence of pain and surrounding erythema and induration, together with the presence of transulcence and gelatinous qualities in general, are the features which are most likely to lead to the detection of torulosis. This would be the case for large lesions such as would be induced by the presence of larger quantities of micro-organisms, as in my experimental monkey. For man it is probable that the lesions do not develop so rapidly, inasmuch as the amount of metastatic micro-organismal matter would be smaller. Such smaller lesions are acneiform, indeed could pass as acne and remain unidentified as mycotic.

(7) After an acute stage extending over three or four weeks the lesions regress. Within eight weeks they eventuate in cicatricial plaques which, however, still contain micro-organisms in smaller or greater numbers.

CUTANEOUS TORULOSIS IN ANIMALS

The disease does not appear to have occurred in the skin of animals except when experimentally induced, although it has occurred internally in a horse[7] and a cheetah.[8] In laboratory animals, however, it is rather readily induced.

As to the skin, Shapiro and Neal[9] reported involvement in a rabbit inoculated intraperitoneally eleven weeks previously with culture material isolated from a human case. The clinical features were not described in such a way as to be of any value in constructing a dermatologic symptom complex. There was a skin lesion on the back over the lower end of the spine, with superficial ulceration and crust formation. Apparently it was not examined histologically or otherwise proven to be due to Torula.

Frothingham's[7] *Tests.*—These were confined to rabbits and guinea pigs. The latter species was more susceptible to skin infection. The lymph nodes became involved by torulosis rather regularly. In fact, lymph node tissue was found in the interior of at least two of the lesions which were regarded as the effect of the inoculations.

Tissue Inoculum.—Emulsion of tissue inoculated subcutaneously on the abdomen induced a diffuse swelling of the entire anterior abdominal wall within a few days. This subsided, leaving only a local enlargement at the site of the needle puncture. At necropsy, twenty-eight days after injection, a pea-sized mass remained comprised of "several translucent gray nodules."

Culture Inoculum.—Three guinea pigs were inoculated in the breast. At necropsy fifteen days later there was a myxomatous nodule the size of a nut with a thick connective tissue capsule. It was adherent to the underlying abdominal muscles through the agency of a caseous mass. A second animal died in thirty-three days. Apparently there were not any breast lesions, only some large nodules in the inguinal region. One measured 3.5 x 2 cm., was reddish-yellow, translucent, jelly-like, and was not encapsulated. A second nodule measured 5 x 2 cm. and had less of the jelly-like qualities. The three animals developed the "usual" subcutaneous swelling in a few days. This ruptured and discharged a purulent gelatinous material.

The author submitted three photomicrographs which were not adequate to illuminate the finer details of cytology. Nothing was brought out except the general reticular effect which is regularly induced in torulosis and the fact that there was in places an attempt at encapsulation. The histological description, similarly, stressed such general appearances as a fine network of connective tissue rather than interpreting the changes. For example, there were occasional giant cells and a few cells in the reticulum, probably endothelial and connective tissue. At times a capsule could be identified, although it was usually not.

AUTHOR'S TESTS ON A MONKEY

These consisted in cutaneous, subcutaneous, and intracardial injections into a *Macacus rhesus*. Incidentally, the animal available was the subject of an endocrine (probably thyroid) dyscrasia with exophthalmos, thickening and deformity of cranial bones and marked mental dullness.

The intracutaneous injections were made on shaved skin over the right shoulder. During attempts at intravenous injections at the elbow and in the groin, culture material escaped into the deep tissues and had the effect of deep subcutaneous injections. An intracardiac injection was made *secundem artem.*

RESULTS OF INJECTIONS (END OF SEVENTEEN DAYS)

Intradermal Injections.—At the site of each of the three inoculations there was a nodule 1 cm. in diameter which had coalesced with its neighbors. Each nodule projected high above the surface, at least 6 mm. It was gray-white, of a soft, rubbery consistency, rather sharply circumscribed and freely movable over the parts underneath. The summit was ulcerated, and from it a translucent gelatinous plug or core could be picked out which was finally resolved into minute translucent

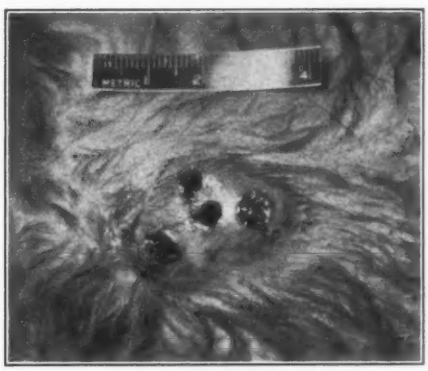

Fig. 1
Experimental lesion on shoulder of monkey seventeen days after inoculation of pure culture of *Torula histolytica.*

granules. Pus was not recognizable. There was free oozing of blood when attempts were made to extract the "core."

The nodules were thus unlike abscesses in that they were not erythematous, not indurated, painful or suppurative. They were unlike tuberculous and syphilitic granulomas in their (1) soft, semi-fluctuating, rubbery consistency, (2) absence of true induration and peripheral erythema which diffuses into surrounding parts, and (3) in their rapid growth.

To recapitulate, the distinctive features of the granuloma were, first, its extremely rapid growth (a nodule the size of a soup bean in seventeen days); secondly, the marked elevation of lesions with almost precipitous margins; thirdly, absence of erythema and true induration; and finally, the translucent, mucoid and non-suppurative character of the core.

Subcutaneous Injections, Groin.—A score or more flat, translucent, gray-white and pink plaques or nodules occupied the groins and insides of both thighs. The parts (bathed in urine) were erythematous, and it was surmised that an intertrigo of this situation predisposed to the development of the nodules. It was felt that they probably originated in materials from the left groin, where attempts had been made to inject culture material intravenously. A few nodules or small superficial plaques also occurred on the left side of the abdomen, extending upwards almost to the umbilicus. In their earlier stages they were pale pink, but became dusky, or even deep red with age. In addition there was a more or less diffuse, firm infiltration of the skin proper throughout the entire inner aspect of both thighs, but without any modification of the normal color of the skin. It was within this diffuse infiltrated area that the nodules occurred.

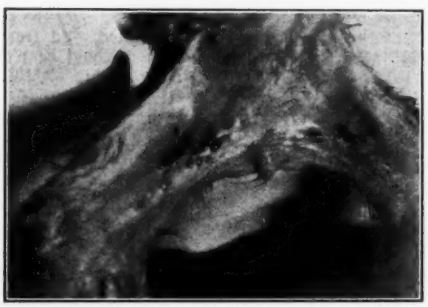

Fig. 2

"Spontaneously" developed fibromas on inside of thighs of monkey. Photo taken contemporaneously with *Fig. 1*. Yeast cells were not demonstrable in the lesions.

The writer sensed that the former were largely due to infiltration by the mucinoid micro-organisms in the case, while leucocytic and other inflammatory infiltration had been superadded at the places where the nodules appeared. However, microscopic examination proved that nothing but granulation tissue was concerned in these changes, both as to the nodules and the more diffuse infiltration. This was of a fibrous type, suggesting soft fibroma or even fibrosarcoma. Yeast cells could not be discovered, prompting thoughts whether the lesions were of the order of torulids.

Left Elbow.—There was a soft, semi-fluctuating nodule 1 cm. in diameter at a position where injections had been attempted intravenously. It was not ulcerative or tender.

Necropsy Findings.—Seven weeks after cutaneous inoculation the animal was killed. There was not any visceral torulosis in spite of the fact that intracardial injection had been practiced. The lesions on the inside of the thighs had entirely disappeared. The lesions on the right shoulder were barely recognizable as vague subcutaneous nodules or plaques confined to the positions originally inoculated. The epiderm had completely regenerated.

Fig. 3

Patch of ringworm spontaneously developed over shoulder near neck. Same monkey as in *Figs. 1* and *2*, but five weeks later.

There were two new lesions. One, on the inside of the left knee, measured 7 mm. in diameter, was moderately elevated, dusky red, and firm. It appeared to be confined to the skin proper. It was not ulcerated. The second new lesion appeared over the left shoulder near the neck. It measured 2 cm. in diameter, was circular and covered by thick scale. The skin was diffusely thickened, producing a sharply outlined non-erythematous plaque. Minute nodules, 1 to 2 mm. in diameter, were scattered over the surface, suggesting that the process was a follicular one. A curious feature of the lesion was the lack of erythema. Fragments of scale were found to consist of hairs and degenerated epiderm, with scarcely any leucocytes. Yeast cells could not be found. Histologic features will be recorded in a subsequent section of this paper.

Summary.—The features which impressed the writer were, first, the speed with which the le-

sions developed; and secondly, their gummy or semi-fluctuating qualities, the absence of pus and pain, and the translucent, more or less gelatinous character of their contents. They tended to ulcerate spontaneously in about two weeks. Incidentally, the nodules over the right shoulder were of a rather bright pink color on the fourteenth day, at a time when they were not ulcerative. By the seventeenth day ulceration had taken place, and the nodules had increased at least tenfold in bulk! This may be a commentary on the speed with which lesions of internal organs like the brain might likewise develop at times. Evidently the capacity for proliferation of this bulky parasite under favorable conditions is great, and would be calculated to lead to prompt and frank symptoms, if only as the result of pressure effects by its mass.

MICROSCOPIC FEATURES OF TORULOSIS IN THE MONKEY

Direct Examinations (Contents of Lesions).—Fragments of the core, examined in water directly under the coverslip, were found to consist almost exclusively of yeast cells. In unstained preparations it was difficult to identify polymorphonuclears; however, they were found sparingly in wet Giemsa preparations. Upon search, the degenerate nucleus of macrophages could be identified in stained preparations; the cytoplasm in such cases was expanded to almost unbelievable proportions by the presence of phagocytosed yeast cel's. The appearances were of the same order as those already well known in the brain and other organs affected with torulosis.

The yeast cells had, in general, the same appearances as those met in cultures. Extremely minute forms predominated, but frequently there were generous numbers which had thinner or thicker mucinoid capsules. The latter were demonstrable not alone in the conventional India ink preparations, but also in preparations made by the wet Giemsa method. In the latter they took the dye faintly, but sufficiently to indicate their presence.

The most marked variation from forms met in culture consisted of gigantic forms* which were rendered even more bizarre because they exhibited multiple buds. Not only did the latter extend in a linear direction, that is, a chain of three or four buds, but at times they extended laterally as well. The more gigantic examples of such forms would measure ten or fifteen times the diameter of smaller ones. Budding occurred in but a small proportion of cells. Mycelium formation was not observed in any case.

Loeffler Preparation (Smears from Core Fixed by Heat.)—There was not any difficulty whatsoever in identifying the fungus forms under the oil immersion lens. The cells were shrunken and distorted surprisingly little considering the heating they had undergone during fixation. The definition of structural details was not nearly so good as in wet Giemsa preparations, however.

Gram Stain.—Here again the fungus forms were readily identified as such. The preparation was not nearly as good as the Loeffler one; it exhibited much distortion of cells. It was difficult to identify the cell wall, which blended both with the cell contents and the surroundings. The contents of cells were Gram-positive and it was this character which served more than anything else to identify the position of the fungus cell. Thereafter, upon search, the examples of budding forms present clinched the diagnosis. These should be sufficient to prevent mistakes in diagnosis of future cases, even in other than experimental cases; that is, in "unknowns" where the nature of the case had not been determined and inquiry is not made specifically for yeast cells.

Tissue (Lesion from Groin Seventeen Days Old).—The epiderm at either end of the section was hyperplastic, giving a picture of a high-grade acanthosis. In the center of the section it was attenuated or even absent; when absent the position was occupied by necrotic material containing polymorphonuclears. Immediately below such positions the papillae were found distended by young granulation tissue. This fibrous tissue reaction continued downward to a level approaching the sweat glands, but in the deepest parts the fibrous tissue was of a more adult type. Here it appeared as though a fibrous hyperplasia was occurring within preformed collagen bundles; as a result of this the granulation tissue was arranged more or less in whorls, suggestive, perhaps, of keloid formation or fibrosarcoma. Yeast cells could not be discovered in the two lesions subjected to study.

Incidentally, one of the two lesions just mentioned had progressed much further than the other in point of denudation; the epiderm was missing over a notable extent of the surface, and the base of this very superficial ulcer was infiltrated with polymorphonuclears to a notable depth. However, there were not any yeast cells discoverable even under these circumstances.

Lesion from Shoulder (Seventeen Days Old).—Normal skin was exhibited at one end of the section. At the other the epiderm was found moderately hyper-

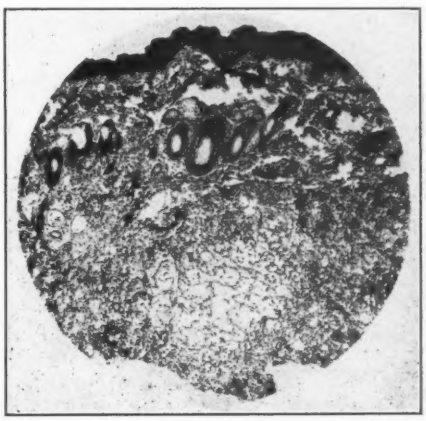

Fig. 4

Lesion in monkey seventeen days after inoculation. The general spongy, reticular effect deep in the corium is due to masses of mucinoid yeast cells. Note scantiness of inflammatory reaction for such a large focus of micro-organisms.

*Analogous forms also occur in the kidney of human cases.

plastic, but not nearly to the degree that was seen in the section just described. However, the epiderm was again missing over what was evidently the summit of the lesion, such a position being occupied by the necrotic material which evidently represented the core which was described.

The granuloma in the case was not encapsulated, but its extent was fairly well indicated by reason of a sharp delimitation of the pathologic infiltrate from the surrounding normal parts. The infiltrate consisted of about equal proportions of (1) yeast cells; (2) inflammatory round cells; (3) a pink granular material which could be identified as the edematous cytoplasm of macrophages. The inflammatory cells consisted more of polymorphonuclears than lymphoid cells and tended to be concentrated into foci; however, they were not sufficiently delimited to be classified as micro-abscesses. In one place at least the leucocytes extended as a tract along the course of a blood vessel, the lumen of which was particularly crowded with them. The macrophages and yeast cells conformed closely to those al-

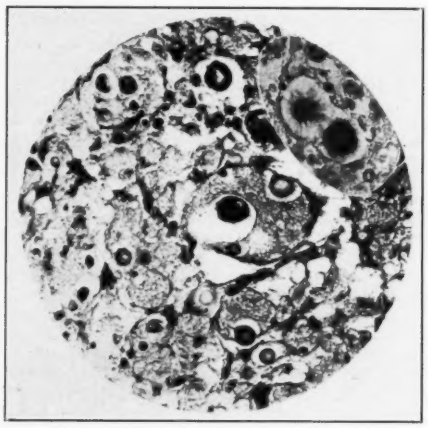

Fig. 5

Lesion from monkey; inoculated seventeen days previously. Illustrating pseudoxanthomatous type of macrophage and giant cells, also the reason for the general reticular effect when viewed under lower power. Note extreme variation in size of Torula cells; also the spaces around them (once contained mucinoid substance) and occasional radial striations across the spaces. Giemsa preparation.

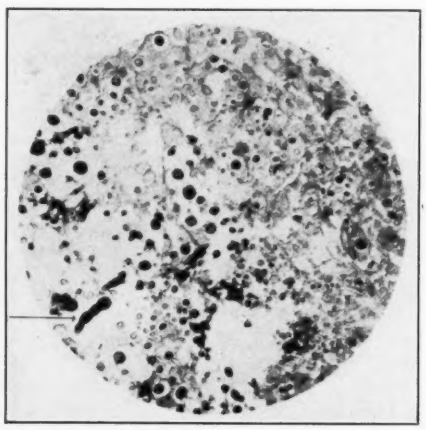

Fig. 6

Lesion from monkey; inoculated seventeen days previously. Hugely swollen, foamy macrophages containing great numbers of Torula cells. Torula grows into but short chains, if at all, and then most exceptionally. Giemsa preparation.

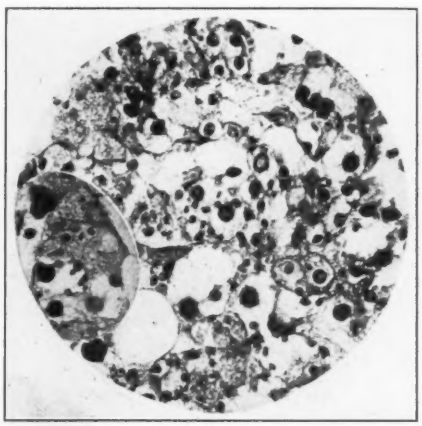

Fig. 7

Lesion from monkey; seventeen days after inoculation. Extremely minute forms of Torula cells are illustrated in a macrophage in the center of the photo. The pseudoxanthomatous type of macrophage, general reticular effect and halo around Torula cells are also well brought out. Giemsa preparation.

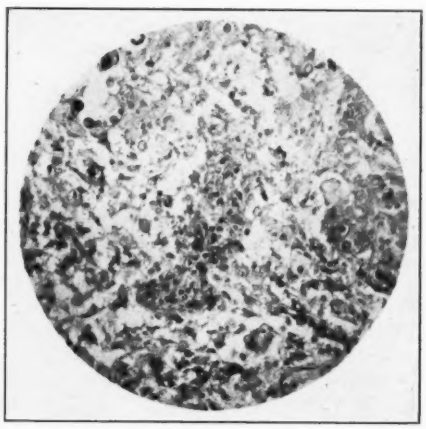

Fig. 8

Lesion from monkey; seventeen days after inoculation. The polymorphonuclears in the center represent a major aggregation for this lesion. It is at most a but slightly inflammatory process.

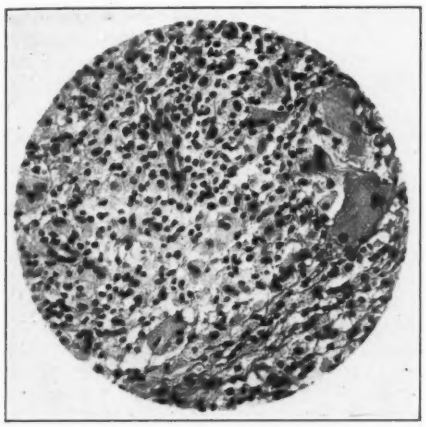

Fig. 9

Lesion seven weeks after injection of Torula culture. The micro-organisms have quite disappeared and the macrophages are shrinking. There is a mild foreign body reaction; the giant cells were not numerous.

ready described in torulosis of the brain and other internal organs. Perhaps there was a higher incidence of small foreign body giant cells than the writer has seen in organs of human cases; however, they obviously represented modifications of the macrophages already mentioned. Endothelioid cells were not present, nor was the round cell infiltration particularly concentrated in the periphery of the lesion as exemplified in tuberculosis, syphilis, and so forth.

The details of the yeast cells were surprisingly good. The cells were somewhat shrunken and distorted by the procedures incidental to histologic technic, but not at all so markedly as has been the writer's experience in other cases of (cerebrospinal) torulosis. The double contour of the cells was frequently sharply indicated. However, the mucinoid envelope had evidently been quite dissolved by histologic reagents, leaving a broad, empty space between the cell capsule and surrounding tissues. Budding forms were scarce. Fine pigment granules sometimes occupied the cytoplasms of macrophages in large numbers.

Skin from Necropsy.—Lesions examined were of two kinds: first, one in which it was known that Torula was injected (right shoulder, left groin); second, lesions in which hairs were observed microscopically with (trichophyton?) spores in them (crusted lesion on right shoulder near neck); third, lesions which were assumed to be secondary to the Torula injections, inasmuch as they occurred definitely and more or less promptly after the injections (inside of both thighs). To these possibly a fourth should be added, namely, the nodule from the left knee which developed much later than the ones on the inside of the thigh. As it turned out in the sections it could not be decided whether the last two mentioned were of Torula or of "ringworm" nature inasmuch as the organism could not be found in either case. However, in view of the evident propensities for the torulous lesions to regress spontaneously, the writer feels that the lesion from the inside of the knee was not due to Torula.

All of the lesions were stained by hematoxylin and eosin, Giemsa and phosphotungstic acid hematoxylin. The Giemsa preparations were found useful only in that the fungus spores in the hairs were much more sharply defined; phosphotungstic acid hematoxylin stained the shells of the Torula cells deep yellow, and in a way that was not approached by any other staining technic of which the writer is aware.

Scar from Left Groin (Torula).—In the superficial parts of the scar there was nothing distinctive. Below it, however, there were a few foreign body granulomas, conspicuous largely on account of the foreign body giant cells present. In each case either a fragment of hair or keratinous substance stood in relation to the granuloma, from which it is concluded that all evidence of Torula activity had disappeared. The reaction observed was due to residual foreign material. The size of the sweat glands was striking. Their lumina were so large that, while not quite cystic, they suggested apocrine glands.

Torulous Lesion of Shoulder.—The lower half of the corium was occupied by a thick stratum of subacute proliferative tissue, rather sharply demarcated from the normal tissue higher up. It consisted for the most part of irregularly shaped, more or less stellate macrophages of the same type as those already described in the seventeen-day-old torulous lesion. At this stage, however, Torula cells were entirely unidentifiable. The cytoplasms did not contain any vestiges of Torula cells nor larger vacuoles which they might have occupied. At most they contained only the most minute kind of vacuoles, but the cytoplasms were invariably coarsely granular, shreddy, and thus acquired a foamy appearance. The nucleus was large and distinct. The outlines of cells were extremely vague and frequently intercommunicated with fellows. The type of cell was remarkably similar to that seen in some forms of xanthoma. The spaces between the cells contained goodly numbers of smaller and larger irregular vacuoles which might or might not represent unabsorbed mucinoid substance. Moderate numbers of plasma cells, goodly

Fig. 10

Lesion seven weeks after injection of Torula culture. In this field there is more shrinkage of macrophages than in *Fig. 9*, and an approach to xanthomatous architecture.

numbers of lymphoid cells, and a few spindle cells were added to the foregoing from place to place. Giant cells were scarce; at least they had but three or four nuclei, had smooth, hyaloid cytoplasms, and did not contain recognizable foreign materials. The presence of such abundant lymphoid and other cells served best to distinguish the lesion from xanthoma. In no case was there a tendency to focalization or any other suggestion of the formation of a specific granuloma.

Crusted Lesion of Right Shoulder near Neck (Trichophytic).—This lesion was clearly different from the preceding ones in that (1) there were two large foci of suppuration in it, (2) there was a high grade of acanthosis in the epiderm, (3) foreign body granuloma formation was highly developed, and (4) fungus spores were identified in hair shafts. Distintegrated hair was found within the pus accumulations, suggesting that the process was essentially a suppurative folliculitis due to fungus. The extensive foreign body reaction, featuring giant cells, brought the picture into line with that of the well known Majocchian granuloma which is already well known in the scalp of man. Torula cells were not found.

The larger pathological changes occurred in the middle and deepest parts of the corium. The more interesting details of the cellular reaction consisted of the large numbers of plasma cells located in the walls of the micro-abscesses and the presence of macrophages which inclined somewhat to the type seen in torulous infection. The latter were in no case, however, of the huge size or definitely foamy character seen in torulosis. They frequently contained minute red spherules of the same size as the fungus spores recognizable in the hair shaft; however, the loss of their blue staining qualities and their vague granular outlines indicated their degeneracy or death.

The fungus in the hair shafts occurred both as solid masses of mycelium extending parallel to the hair fibers and spores in the periphery.

Regressive Lesion on Right Thigh.—Seventeen days after injection this position was occupied by nodules having more or less of the histology of fibrosarcoma. At necropsy the nodules had quite disappeared. Under the microscope their position is indicated more by a persisting acanthosis in the epiderm than anything else. The corium underneath such positions showed no traces of a previous "fibrosarcomatous" process. At most there were two or three areas of edema and round cell infiltration. In one of the latter a fragment of degenerate hair was recognized surrounded by goodly numbers of polymorphonuclear leucocytes, but neither Torula nor fungus spores could be recognized. It is probable (from the leucocytic features) that the lesions on the inside of the thighs were of trichophytic rather than torulous nature.

Spontaneous Nodule from Left Knee.—The nodule consisted of a central focus of polymorphonuclear leucocytes which were surrounded by macrophages and plasma cells of a kind similar to the ones already described in the Majocchian granuloma from the shoulder. The presence of a hair shaft adjacent to the leucocytes made it appear certain that the lesion was akin to the Macjocchian granuloma rather than to the torulous lesions, although neither fungus spores nor Torula cells could be identified.

Histologic Summary (Lesions from Necropsy). All vestiges of Torula cells had disappeared from the lesions which were definitely known to have been torulous. The macrophages had shrunken and lost their foamy or mucinoid cytoplasmic characteristics and were reduced to a more normal size and character. At this particular stage at least the resemblance was strong to xanthoma.

The other lesions were referable to a complicating and disturbing trichophytosis which singularly coincided with this experimental Torula infection. The trichophytic nature was unequivocally proven by the presence of the fungus in one lesion, and almost certain in two others, as shown by the suppurative features around hair shafts. There is still the theoretical possibility that the lesions which appeared promptly after the Torula injections were present as lesions of trichophytosis at the time the Torula injections were made, and that the injection of an increment of fungus substance, although heterologous, induced allergic or other immune changes which touched off the existent trichophytic foci. Otherwise it is difficult to explain the sudden flare-up of these clear-cut suppurative folliculites of trichophytic causation. An alternative explanation would be that the Torula cells had been determined, whether by the circulating blood or by massage of the surface, into the existent unrecognized trichophytic lesions, and were themselves responsible for the more exaggerated lesions which subsequently developed.

Fig. 11

Torula histolytica culture ten weeks old. Its semi-fluid character is obvious. It is pale chocolate brown in color. On glucose agar with Chassaing peptone (Pennsylvania medium) pH 5.4.

The absence of the Torula cells themselves in the histologic sections would be readily explained on the same basis as their disappearance in the known torulous lesion, that is, their death and resorption at this late stage of the disease process. The writer is inclined, however, to discredit the latter idea in view of the fact that the lesion on the left knee developed comparatively late in the entire disease course, at a time when immunologic processes had become developed and the Torula cells were being destroyed.

CULTURAL CHARACTERISTICS OF TORULA HISTOLYTICA

These have been recorded in some detail in Freeman's monograph. In short, the primary cultures are usually secured without much difficulty, but not invariably. The colonies grew slowly in primary cultures and rather rapidly in subcultures. At first they were non-distinctive, having the moist, yeasty, pasty qualities common to many different species of yeast. Colonies tended to be highly mounded rather than flat, and glistening white or creamy. After four or five weeks they became brown and so watery as to slide largely into the bottom of the test tube. Dissociation, with the formation of non-pigmented sectors, was not uncommon in old cultures. The micro-organism grew both at incubator and room temperature, was an obligate aerobe, and grew equally well on ordinary bacteriologic and the conventional Sabouraud type of medium (pH range 5.8-8.6). The specimen was easy to carry in subculture; I have kept a strain going for nine years. Its capacity for fermenting carbohydrates and other substances is almost nil; there is not any gas production in glucose, dextrin, saccharose, maltose, lactose, galactose, inulin, raffinose, levulose, adonite, mannite, arabinose, salicin, dulcite, or sorbite.

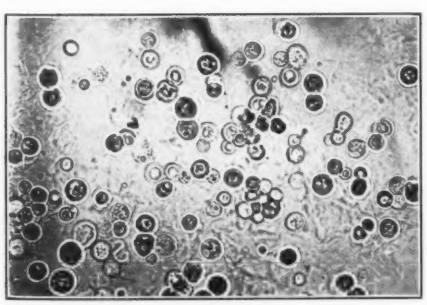

Fig. 12

Three months' old culture of *Torula histolytica* grown on glucose agar. The doubly contoured shell is distinct, but mucinoid envelope cannot be made out in this (watery) mount. Resting cells are larger and have dense, solid contents.

As to acid production, Dr. Fitchett's strain was active only for glucose, levulose, and saccharose. Of 19 strains of Torula from cerebrospinal cases which I have tested, all produced acid in glucose and levulose; gas was not produced in any of the fermentable substances listed above. In respect to other "sugars," however, there was great irregularity on the part of different strains, the most extreme being ones which produced acid in glucose, levulose, and saccharose, as well as maltose or raffinose or inulin or mannite. It appears from this that such differences in acid production cannot be invoked to create new species of this Torula, at least at the present time.

It resists gentian violet in a concentration of 1-1000 (as grown on glucose agar containing the dye).

Microscopic Appearance.—The variation in size of cells and the conspicuousness of mucinoid capsules have been already illustrated in photomicrographs. Hyphae are met only in very old cultures, and are so abortive as to be designated at best as pseudomycelium. The cells otherwise are large spherical ones of the type familiar in the Monilias. The shell is thick; mucinoid envelopes comparable to the ones seen in tissue occur only in old cultures and are thicker in large cells than in small ones. Budding forms may be scarce; frequently they are ovoid or pyriform. The interior of large cells may be dense, solid, and hyaloid (resting stage?) or contain up to 6 or 8 spherical refractile granules. Ascospores are absent.

Experimental Animals.—Mice and rats are the animals of choice; guinea pigs and dogs are rather resistant.

MICROSCOPIC TECHNIC

Allusion was previously made to the fact that Torula, probably due to comparative softness of its cells and liability to distortion by fixing procedures, might readily escape detection both in histologic sections and in smears prepared by the ordinary bacteriologic technic. The situation for the protozoa may be recalled, where special methods of fixation and other procedures are necessary. Indeed, with protozoa it is preferable that the preparation should never be allowed to dry out at any stage of the technical procedures. For many yeast cells the situation is comparable. With *Torula histolytica* in my cutaneous materials the results were capricious with ordinary technics. At times very good re-

sults were secured without special precautions; on the other hand, other preparations resulted where the details were so inadequate that the Torula cells defied recognition.

It is therefore necessary to take special precautions in those cases where Torula cells are to be demonstrated beyond peradventure in the specimen if, as, and when present. To this end resort may be had to the following procedures. They are applicable both to pus and frozen sections; the latter are almost indispensable if absolute certainty is desired.

Wet India Ink Technic (*Weidman and Freeman.*[12])—A minute drop of India ink is placed on a slide. The suspected material is quickly stirred into it and the coverslip promptly applied. The procedure must be conducted speedily because the India ink dries out rapidly. The drop of India ink should be barely sufficient to fill the interval between coverslip and slide in order to yield as thin a film of India ink as possible. By this technic a darkfield effect is obtained which brings out the mucinoid halo around the Torula cell better than any other way, besides being restful to the eye during prolonged examinations.

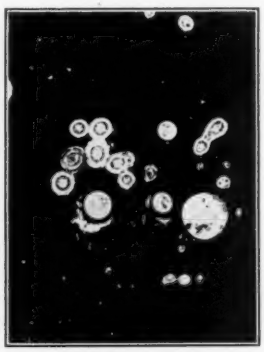

Fig. 13

Wet India ink preparation, bringing out the mucinoid envelope (halo) around the Torula cells. The (3) spherules without halos are air bubbles.

Wet Giemsa Technic.[13]—A similar minute drop of undiluted Giemsa solution is placed upon a slide. Into it the pathological material is stirred (or laid in the case of frozen sections). Apply a coverslip promptly. Again, pressure may be applied to the coverslip in order to express any excess of Giemsa solution due to the drop's having been too large, removing the excess around the edges of the coverslip with bibulous paper. In 5 to 10 minutes the interiors of the cells become stained. A clearer and more adequately differentiated preparation will be secured by flushing distilled water from one edge of the coverslip to the other. This of course must be done cautiously in the case of pus; nevertheless, a sufficient number of large particles will adhere between coverslip and slide to give results. Of course this is a temporary preparation, one that will last but a few days.

SUMMARY AND CONCLUSIONS

While it occurs but rarely, *Torula histolytica* still has the capacity to induce acute, subacute, or chronic lesions in the skin, probably only when the disease is more or less generalized. The clinical features of cutaneous torulosis have not yet been established dermatologically because too few cases have been recorded in the literature. Under these circumstances, cases of the future are likely to be identified through the dermatological avenue only by laboratory examination.

This communication catalogs and analyzes the meagre clinical data of cutaneous torulosis available for man and an experimental monkey, and describes in some fullness the laboratory features as regards (1) pathologic histology; (2) experimental reproduction in animals; (3) morphology of *Torula hystolytica* in pus; and (4) cultural characteristics of *Torula histolytica*.

There were not any difficulties in the identification of Torula in either the pus or histologic sections of the skin of the experimental monkey because the materials had been fixed and prepared under favorable mycologic conditions.

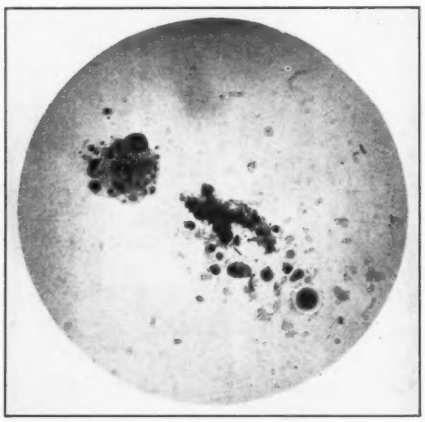

Fig. 14

Wet Giemsa preparation. A macrophage contains large numbers of Torula cells: larger ones with halos (mucinoid capsules). Halos are also indicated elsewhere in the photo.

However, experience with the same micro-organism in visceral cases have not been so happy. For example, the organism may become so shriveled or otherwise modified during routine bacteriologic or histopathologic technics that it escapes recognition. In order to avoid such accidents, which are also quite possible for cutaneous cases, the following recommendations are made:

(1) In connection with granulomas and ulcers of undetermined nature, resort should be had more frequently to the direct microscopic examination of pus in potassium hydroxide preparations.

(2) Details of structure of yeast cells, such as are necessary for the differential diagnosis of torulosis from other blastomycoses, will be facilitated by the employment of the *wet* Giemsa and the *wet* India ink technics.

(3) Frozen sections, examined in a watery mount (preferably containing dye), yield details of structure that cannot be approached by paraffin sections. These should supplement routine paraffin sections in any exhaustive study of granulomas of undetermined nature.

It is only with closer attention to these details in technic that the dermatologist can expect to uncover more and more instances of torulosis as it affects the skin. Fortunately, the number of fungus cells in torulosis is so great that they can scarcely be overlooked; it is the technic of preparing the specimen that makes for failure or success.

The identification of Torula as the causative organism in such lesions might well attract attention to an associated cerebrospinal or generalized torulosis, an affection of the utmost gravity and one that is almost invariably fatal. However, there is some evidence that torulosis (muscles, pelvic tissues and perhaps skin on occasion) may remain localized, its micro-organism may be destroyed, and it may be followed by complete, perhaps permanent, recovery.

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A STUDY OF THE SPLEEN IN VARIOUS DISEASES BY NEW METHODS: PRELIMINARY REPORT*

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Since the time, centuries ago, when the spleen was said to be the seat of anger, a great deal of importance has at all times been attached to this organ. A great deal of speculation and thought have been expended and a great many studies have been made in attempts to determine the importance and function of the spleen and yet, at the present time, our knowledge of this organ is rather hazy, indefinite, and unsatisfactory. The spleen is now definitely catalogued as belonging to the blood organs and its function is said to be concerned with hemopoiesis, but just what part it plays and how this function is performed and even the details of its structure are still matters of discussion and differences of opinion. That it is not essential to life we know, for by careful surgery it can be removed and the patient suffer no apparent deleterious result. When death occurs following splenectomy such a result cannot, in the light of our present knowledge, be attributed to the loss of the spleen. So, whatever its function, it is shared with other tissues and organs.

According to Maximow, so far as the cells comprising the parenchyma of the two structures are concerned, there is no difference between the spleen and the lymph nodes. The differences are, first, in a great deal more elastic tissue and smooth muscle fibers in the capsule and trabeculae of the spleen, which might be due to its greater size rather than to any functional importance. Second, the great difference is in the vascular systems, both their character

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and structure. In the lymph node the main vascular system is lymphatic, the blood vessels being a minimal nutritional supply. In the spleen there are no lymphatic vessels in the parenchyma, so the sole vascular tree in this region is blood. Further, the arteriovenous communications have lace-like walls, the foramina of which allow the cells circulating in the blood to pass freely outside the vessel walls, so that red blood cells are at all times mingled with the parenchyma cells of the spleen. The third difference between a lymph node and the spleen is in the arrangement of the parenchyma. In the spleen there are zones around the terminal arteries in which the spleen cells are massed, and in which there are no sieve-like arteriovenous connections, so that as one looks at a section of the spleen one sees these zones as blue-staining areas rather definitely but not sharply separated from the redder staining general field. Maximow states that the blue areas (white pulp or Malphigian corpuscles) structurally shade imperceptibly into the red pulp. The difference in staining between the two pulps is due to the presence of red blood cells in one and the absence of these cells in the other area. In general, it is stated that the function of the spleen, before birth, is concerned to at least a considerable degree with the formation of red corpuscles, but after birth this function is exhibited only under rare conditions when the bone marrow is incapable of sufficient erythrogenic activity, and that in all postnatal life the function of the spleen is mainly that of destruction of erythrocytes. This latter fact is based mainly on the clinical observation that in diseases like hemolytic jaundice and thrombocytopenic purpura, removal of the spleen cures or checks the disease which seems to be based on excessive destruction of red cells. According to all writers on the subject, the hemocytogenic function of the spleen before birth is due to the presence in the spleen of myelogenous tissue, or to those polygenic cells which may give rise to a variety of adult cell forms. Some of these polygenic cells must be present in the spleen throughout life otherwise the spleen could not resume the erythrocytic function which all authorities agree it can and does under certain circumstances. After birth the erythrogenic activity of the spleen, according to authorities, subsides normally to the zero point, and the spleen develops into the main erythrocytolytic agent of the body. It also, in common with other lymphatic tissue, produces monocytes and macrophages. The erythrolytic function, we are told, is accomplished by a process of phagocytosis of the red cells by the macrophages and endothelial cells lining the venous sinuses. These cells also take part in breaking down the hemoglobin into its constituent simpler compounds. Thus it would seem that the function of the spleen is both constructive and destructive.

Because of the indefiniteness and unsatisfactory character of the present knowledge of the spleen, we have had in mind for a number of years to make some studies of the spleen in various diseases in the hope that we might find some additional evidence of the function of this organ and it is for the purpose of presenting the facts or indications of facts so far discovered that this paper is presented.

Methods.—Studies that have been made of the spleen heretofore have either been by means of histological sections of the organ stained in various ways, by digestion or by other means removing the free cellular elements, by injection of the vascular system, and by experimental methods of removal of the spleen. Since these methods have been employed by many competent workers, there was little use of repeating work which has often been done. The difficulties in the study of sections of the spleen are that the picture is confused by the fact that one must pick out individual cells from a mass several layers deep. The larger cells are cut so that only sections of them are seen, and the stroma cells and fibers are a confusing element. Therefore, we tried methods which, so far as we know, have not been applied to this organ. The method was suggested by the use of the Frothingham technic of obtaining material for study in suspected cases of hydrophobia. This technic gives largely a cellular picture, free from confusing stroma, in which the cells are in most nearly their normal condition. It also gives much thinner sections than can be gotten by histological methods with at all times complete cells. The method consists of taking a small section of spleen and pressing it gently on a clean microscopic slide. The thickness of the impression desired can be determined by the amount of pressure applied in making the impression. The first impression is usually jumbled because of the passage of the knife through the tissues in making the block. The later impressions from the same block gave a better picture. By making several impressions on one slide a large field for study can be obtained with a minimum of slides. The gross material must be as fresh as possible and unfixed. Impression preparations thus made were treated in several ways. Some were stained immediately,

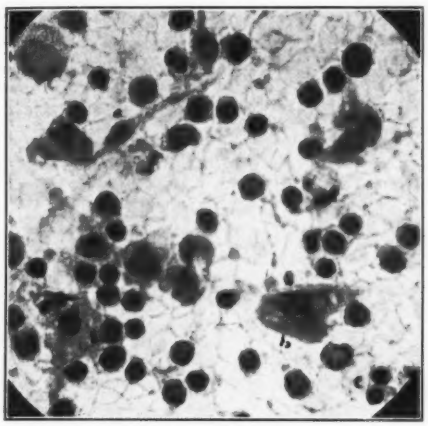

Fig. 1
Formalin fixed, hematoxylin-eosin. (a) Fibrocyte. (b) Macrophage. (c) Nucleated reds.

some were dried and stained subsequently, some were fixed in formalin, and some in Zenker's fixative. Impressions thus secured were stained by various methods, including Wright's blood stain, Giemsa, Giemsa-Leishman, and hematoxylin-eosin. These were then studied to see what cells were present and if there was any difference in the proportion of the various kinds of cells in various diseased conditions. This latter subject is one which we are now engaged in studying.

We found that none of the blood film stains gave very good pictures except that the Giemsa stain did differentiate the monocytes and leucocytes from the splenocytes. The hematoxylin-eosin following either fixative gave the clearest and most detailed picture. The formalin laked the red cells so that only the nucleated living cells show, except that the dim outlines of the red cells can be seen. The Zenker fixative preserved all cells and has a further advantage in that the difference between the young and old red cells is brought out by the intensity of the eosinophilia. We also found that thirty minutes in Zenker was sufficient time for satisfactory fixation. By washing the fixed slide a few minutes in water and placing it in 30 per cent alcohol it can be preserved indefinitely and stained when desired. The corrosive sublimate can be removed in the usual way for Zenker material. The difference between the Zenker and formalin fixed preparations is well shown in *Figs. 1* and *2*.

The material used in these studies was obtained from autopsies or surgical operations and includes the following pathological conditions: lung abscesses, gangrene of the bowel, pneumonia, thyrotoxicosis, still birth, obstructive jaundice, pericarditis, myocarditis, neoplasm, trauma, sepsis, bichloride poisoning, abscesses other than lung, vascular disease, and nephritis. The age of the patients varies from the full term fetus to eighty years of age.

When we began the study of the slides prepared by the technic described above, we were glad to find that a few fibrocytes, or stroma cells, appeared among the blood and spleen cells of the impression (*Fig. 2*). The number of the fibrocytes varied with the condition of the spleen. In those cases where the consistency of the spleen was friable, more of these fibrocytes appeared in the preparation. That they should be present in a friable spleen was not surprising, but that they were found also in spleens from which the pulp scraped with difficulty was more gratifying. The presence of these fibrocytes was evidence that we were getting the cells as they occurred in the specimen and not merely a diffuse surface smear.

By the methods employed it is fairly easy to differentiate the hemocytes, that is, the cells from the blood stream, from the splenocytes, or cells of the spleen pulp, although they may be morphologically similar. But the exact cataloguing of the splenocytes is attended by so many difficulties that so far we have made no attempt to do so. In the first place, histologists and cytologists do not agree on a classification of these cells. The small and medium sized

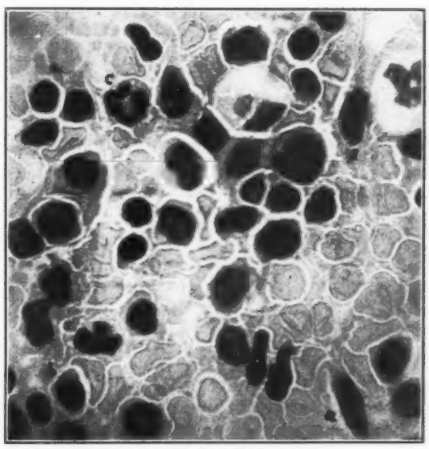

Fig. 2
Zenker fixed, hematoxylin-eosin. (a) Fibrocyte. (b) Nucleated red. (c) Polymorphonuclear.

Case	Chief Pathologic Condition	Complications	Weight of Spleen	Age
15	Abscess, brain	Post-infarction, acute enteritis, and acute lymphadenitis	25 gm.	3 years
25	Abscess, brain	Beginning pneumonia	125 gm.	43 years
1	Abscess, lung	Following tonsillectomy	450 gm.	37 years
10	Abscess, lung	Pneumonia	10 gm.	6 mos.
3	Gangrene of bowel	Mesenteric thrombosis	200 gm.	40 years
27	Hypertension	Advanced, diffuse, chronic nephritis	150 gm.	28 years
9	Icterus neonatorum			10 days
5	Obstructive jaundice	Surgical	800 gm.	22 years
18	Myocarditis	Senile nephritis, hypertension	50 gm.	70 years
11	Neoplasm of spinal cord		125 gm.	17 years
28	Adenocarcinoma of lung		125 gm.	21 years
20	Carcinoma of bladder	Pyelonephritis	50 gm.	74 years
21	Carcinoma of liver		55 gm.	60 years
14	Carcinoma of uterus		575 gm.	51 years
23	Carcinoma of uterus	Pyelonephritis, pericarditis	400 gm.	46 years
6	Spermatoblastoma	Metastasis to lung	125 gm.	36 years
26	Hydronephrosis	Lung abscesses, gangrene of scrotum	225 gm.	44 years
17	Nephritis	Enteric polyps, obstruction pus tubes	95 gm.	19 years
4	Pericarditis	Pneumonia	200 gm.	17 years
7	Mercuric chloride		35 gm.	23 years
8	Pneumonia	Puerperal sepsis	75 gm.	18 years
19	Pneumonia		75 gm.	80 years
24	Confluent bronchopneumonia	Chronic nephritis, cystitis	100 gm.	77 years
12	Sepsis	Post traumatic	200 gm.	23 years
13	Sepsis	Tuberculosis	575 gm.	36 years
29	Sepsis, peritonitis	Appendicitis	150 gm.	45 years
31	Splenic anemia	From outside hospital; no data		
2	Still birth			
30	Trauma		75 gm.	48 years
22	Thyrotoxicosis	Following thyroidectomy	225 gm.	47 years
16	Vascular	Lung infarct	60 gm.	66 years

lymphocytes are easily recognized. But the monocytes, and various cells which shall be included in this group, the large lymphocytes, the free endothelial cells, reticular phagocytes, myelogenous cells, and others are not easily differentiated, because such differentiation depends on fine points of granulation, nuclear structure, and so on, which can be brought out only by special staining methods which often work only in the hands of certain investigators. Then there arises the question as to whether or not such differentiation is justified. In the works published in which these cells are reported, there is no evidence that the authors have considered such factors as stage of development of the cells, functional activity, state of health or degeneration, the physical and chemical effects of fixatives, all of which would effect the presence or absence and staining reaction of such structures, if they be structures. The nuclear picture of the cells in our preparations in the formalin fixed material differed from that in the Zenker fixed material. Even nuclear shape, in free cells, especially those with ameboid movement, is not always constant, so it is unreliable as a differentiating criterion. So for the present we are not attempting any definite classification of the splenocytes found.

One of the first things that attracted our attention in the study of our preparations was the unexpected number of polymorphonuclear leucocytes present (Fig. 3). Since, as was mentioned above, the cells in the circulating blood pass through the vessel walls and mingle with the splenocytes of the red pulp, one would expect to find a certain number of polymorphonuclears in a spleen picture such as we had. But we were not expecting the number of these cells which we found. The number present did not seem to bear any definite relationship to the number present in the circulating blood as determined by the blood count made in the usual way. The number present, however, did vary with the disease condition of the patient. The fact that the polymorphonuclears have ameboid motion would be a factor in the number present. Because of

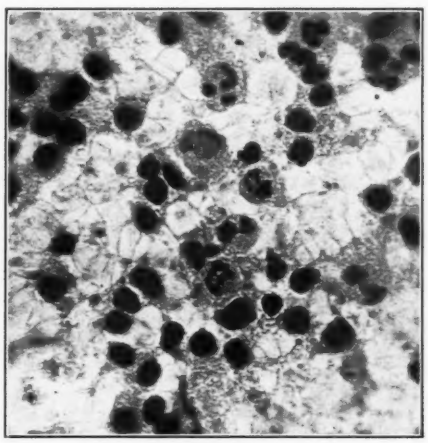

Fig. 3
Formalin fixed, hematoxylin-eosin. Disintegrating polymorphonuclear cell detritus among cells.

their power of locomotion they might exercise an option as to whether or not they passed out of the vessel, and for the same reason the length of their stay would be shortened over that of the red cells which are at all times passive and drift with the current. Further, there might be factors in the spleen pulp, as in other tissues which would attract polymorphonuclears, which could account for a greater number in some cases than in others.

But it was not alone the presence but the condition of the polymorphonuclears that interested us. Most of these cells showed separation of the nuclear segments, vacuolization of the nuclear masses, swelling of the nuclear masses, and other conditions which point to disintegration processes.

For a long time the question, "What becomes of the polymorphonuclears, normally?" has gone the rounds of the cytological world. Most authorities merely shake their heads. Some attempt answers, one of which is that they wander out into the intestinal canal and so are lost. While this type of event undoubtedly takes place, not only in the intestines but also into the mouth and the urinary tract, this process is too variable to be considered as a normal function. That polymorphonuclear destruction is an active and not a chance phenomenon is shown by the findings of Maximow and others, that they are phagocytized by macrophages and even by the megakaryocytes of the bone marrow. The findings in our material would suggest that normally the spleen is the graveyard of the polymorphonuclears. The evidences pointing to this conclusion are: (1) disproportionate number of polymorphonuclears in all of our preparations regardless of the disease in other parts of the body; (2) and more so the evidences of disintegration and dissolution of a majority of the polymorphonuclears present (*Fig. 3*).

Some other surprises greeted us. These were in regard to the erythrocytes. Since the destruction of the red cells was first attributed to the spleen, such destruction has been described as follows: the erythrocytes are said to be phagocytized by the macrophages and endothelial cells lining the venous sinuses, and are digested by these cells, the hemoglobin content of the digested red cells returned to the blood in the form of its principal constituent compounds. Maximow and others have published drawings showing the red cells ingested by the macrophages and other cells mentioned above. All students of pathology have seen the phagocytosis of red cells in cases of escape of red cells from the blood vessels, in cases of hemorrhage into the tissues in inflammatory processes, trauma, and passive congestion. Phagocytosis of red cells under these conditions, however, is normal only in that the process takes place under all such pathologic conditions.

A careful search of all our material did not show a single instance of a red cell included in the protoplasm of any cell, although there were present great numbers of the cells said to phagocytize red cells. What we did see was that, as was mentioned above, in impressions fixed in Zenker there was a difference in the density of the eosin in the red cells, and there was a great deal of cell debris which was apparently fragments of red cells (*Fig. 4*). The difference in the degree of eosinophilia was interpreted as indicating the age of the cell because, as will be brought out below, there was no doubt that the cells taking the deepest eosin stain were very young cells. We did find that the macrophages, especially in some cases, showed the presence of hemoglobin or its constituents. Unfortunately, we did not have a case of hemolytic jaundice or thrombocytopenic purpura in our series.

These findings indicate that the hemocytolysis which occurs in the spleen is largely an extracellular enzymatic rather than intracellular phagocytic process. This was further indicated by the condition of the polymorphonuclears discussed above. If this is true, it would explain some of the clinical facts of various blood diseases such as excessive hemolysis, increased fragility, and thrombocytolysis, which affects the

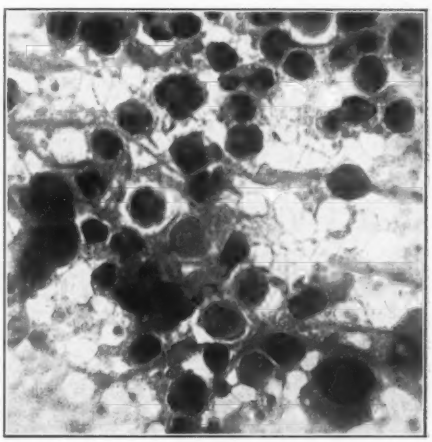

Fig. 4
Formalin fixed, hematoxylin-eosin. Shows cell detritus among cells.

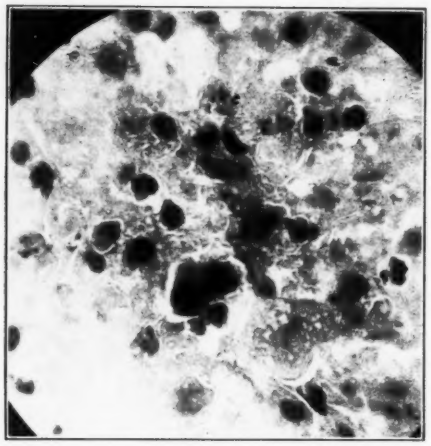

Fig. 5

Zenker fixed, hematoxylin-eosin. (a) Nucleated red. (b) Extrusion and karyorhexis of red cell nuclei. (c) Disintegrated polymorphonuclear.

cells in the circulating blood. Boyd states that in congenital hemolytic jaundice the removal of the spleen has little or no effect on the fragility of the red cells and suggests that this phenomenon is due to some defect in hemocytogenesis. Boyd also remarks upon the great hemosiderosis of the macrophages of the spleen and all the reticulo-endothelial system, but makes no mention of phagocytosis of red cells. The increase in the size of the spleen in most cases of blood diseases is not due so much to an increase in the amount of pulp as it is due to congestion, excessive diapedesis and other factors, so that the increased hemocyte destruction could not be attributed to increased number or increased phagocytic activity of the splenocytes, but rather to an enzymatic process.

We are aware that the question comes up, if the hemolysis by the spleen is enzymatic, why are not all erythrocytes attacked? To this we will have to answer that we do not know that they are not. Perhaps this is one of the factors that decides the span of life of the red cells. If they are not all attacked we should have to place this question along with those similar questions as to why the gastric juice does not normally attack the stomach mucosa, or the pancreatic enzymes do not attack the pancreas normally, or why both do not attack the intestinal mucosa. Also we should raise the question, if the hemolysis by the spleen is phagocytic, what factor decides which red cells are phagocytized?

Another surprise we had was the finding of nucleated red cells and erythroblasts with the typical basophilic cytoplasm (*Figs. 5* and *6*). These cells were found in practically all of our preparations, but varied more widely in number than almost any other element. They were present in greatest number in *Case 28*, in which the chief pathologic condition was adenocarcinoma and lung abscesses. We also found extruded red cell nuclei, and others in the process of nuclear extrusion. It was the deep eosin staining of the nucleated reds that suggested to us that the degree of eosinophilia of the erythrocytes in general was an indication of the age of the cells. The finding of these young forms of erythrocytes in all our preparations indicates either that erythrogenesis in the spleen does not normally cease shortly after birth, but is a continuous process throughout life or that the spleen is called upon to re-assume this function much oftener than is generally supposed, which would mean that erythrogenesis by the bone marrow is much easier and more often affected than is generally supposed.

In conclusion, we appreciate that our series of spleens was small and yet it is large enough to give many indications and suggestions. As was said in the title of this paper, this is only a preliminary report and we have carefully avoided dogmatic statements and definite conclusions. We are presenting it as food for thought and in the hope of stimulating similar studies by others. The possibilities of such studies are

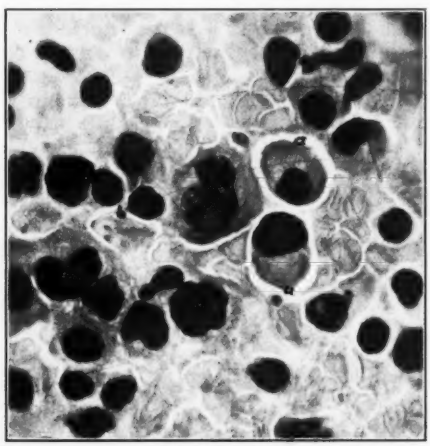

Fig. 6

Zenker fixed, hematoxylin-eosin. (a) Erythroblasts. (b) Small lymphocytes.

great, and give promise of very greatly increasing our knowledge of the spleen and its functions and explaining many facts of hematology now in obscurity.

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DUODENAL DIVERTICULUM*

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Diverticula occur throughout the intestinal tract in the following order of frequency: colon, ileum, esophagus, pharynx, duodenum and stomach.

The first case of duodenal diverticula reported was described by Chomel in 1710. The published reports indicate an incidence ranging from 1 to 15.5 per cent in routine x-ray studies.

Diverticula may be classified as "congenital" and "acquired," "true" and "false." "Congenital" and "true" may be used synonymously; the acquired type are usually false. A true diverticulum is formed from the normal layers of the intestinal wall; mucosa, submucosa, muscularis and peritoneum. In the "false" type the muscularis is absent.

The congenital etiology of diverticula is suggested by their normal occurrence in embryos in the development of the liver and pancreas. They are found lying free, with no adhesions, ulceration, inflammation or other pathologic condition to account for their presence. They are usually mobile.

The congenital type is found most frequently in the second portion of the duodenum; the acquired type in the first portion. In 80 per cent of the cases they are single, but as many as five have been reported in a single case. They are most commonly seen in patients past 40 years of age. Shaw, however, reported a case in an infant.

No case of duodenal diverticulum has been diagnosed previous to operation or autopsy, except by x-ray.

The great majority of diverticula give no symptoms and are diagnosed in the course of x-ray examination for other conditions. Occasionally they are responsible for symptoms, but there is no definite clinical picture. In the case reported below, rather marked symptoms were present, which were completely relieved by operation. Since no inflammation was present in the sac, the pain complained of was probably either reflex or due to spasm.

CASE REPORT

F. D., a white man of 39 years of age was admitted to the hospital on May 14, 1932, with a chief complaint of "stomach trouble". For the previous two years he had been having a sense of heaviness in the epigastrium which had gradually changed into a distinct and severe pain. This pain came on soon after meals, did not radiate, and was relieved by vomiting. Fried or greasy foods added to the discomfort and he believed he had an attack of jaundice about one year previous to admission.

Physical examination showed a fairly well developed, but somewhat emaciated white male of middle age. (Height 67 inches, weight 125 lbs.) He was rather nervous and concerned about himself. A congenital ichthyosis of the hands, arms, feet and legs was present. The heart and lungs were normal and no pathological findings were noted except a point of tenderness in the mid-epigastrium. No masses or rigidity were present.

The laboratory reported urine, feces, sputum and blood Wassermann negative. An x-ray study of the gallbladder showed normal physiological action. A gastro-intestinal study made by Dr. Mayoral, was reported as follows:

"Radiographic and fluoroscopic examination reveals a high stomach, showing no filling defects, that empties completely in six hours.

Fig. 1
Congenital diverticulum of the duodenum.

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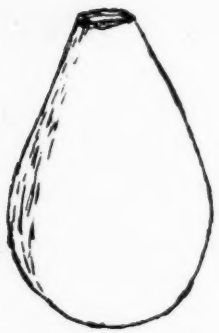

Fig. 2
Roughly diagrammatic representation of the diverticulum seen in Fig. 1 after removal and distention with water.

"From two to two and one-half inches from the pylorus a rounded shadow of irregular borders is seen, entirely outside of the lumen of the intestine, but connected to it by a narrow neck. This shadow is seen constantly in fluoroscopy and subsequent films but it has emptied at the six hour film (*Fig. 1*).

"The radiological findings suggest the presence of a diverticulum, either in the distal part of the first portion, or the second portion of the duodenum."

The abdomen was explored on June 6, 1932, through a high right paramedian incision. The gallbladder, stomach and pylorus were normal. Through an incision in the gastrocolic omentum the second portion of the duodenum was mobilized. The diverticulum was found lying free in loose areolar tissue, opening into this portion of the duodenum by a constricted neck. It was removed, the stump ligated and inverted, and the defect covered by several interrupted sutures placed transversely to the axis of the bowel. When distended with water the sac measured 1¾ inches in length, by 1 inch in diameter (*Fig. 2*).

The pathologist, Dr. Lanford, reported as follows:

"Section is made up of a tube-like structure lined with a mucosa such as is seen in the intestinal tract, which is resting on a thin submucosa, and it in turn on two muscular coats. There is some congestion, with free blood in the lumen and many desquamated epithelial cells."

Recovery was uneventful. A complete relief from abdominal symptoms was experienced, and the patient was discharged in good condition June 23, 1932. An attempt to follow up the case was unsuccessful.

CONCLUSIONS

(1) A diverticulum of the duodenum may give rise to symptoms, in which case the treatment is operative.

(2) The reported frequency of "true" duodenal diverticula is thought to be too high, only one case having been noted in several thousand gastro-intestinal studies in this hospital. "False" or acquired diverticula are found more frequently. No treatment is indicated in the absence of symptoms.

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PERINEPHRITIC ABSCESS: REPORT OF FIVE CASES*

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The literature and our cases show that the diagnosis of perinephritic abscess is long delayed in many instances and our purpose is briefly to review the more common signs and symptoms and again to remind the profession that perinephritic abscess, although uncommon, is not rare.

Brunn and Rhodes[1] compare the above condition to acute hematogenous osteomyelitis in children and believe that while in children the metastatic infection lodges in the bone marrow, in adults the metastasis lodges in the perinephritic spaces. These abscesses more often arise from skin infections, particularly from boils and carbuncles, and it is probable that their metastatic location is determined by the type of terminal blood supply to the kidney and fatty capsule, the typical end arteries. They further believe that these end arteries hold clumps of bacteria which set up a local focus of inflammation. Some may be destroyed there by the renal epithelium; others may cause abscess in the cortex and subsequently break through into the perirenal fat and cause secondary abscess; still others may lodge directly in the end arteries of the perinephritic fat, forming an abscess.

Karsner[2] believed that "the most frequent cause (of perinephritic abscess) is extension from abscesses in the renal cortex, which infiltrate between kidney and capsule, invade the capsule, and then extend to the paranephric tissues, especially the fat." Hunt,[3] reporting 106 cases of perinephritic abscess, states that 19 cases were secondary to renal infection, 28 to

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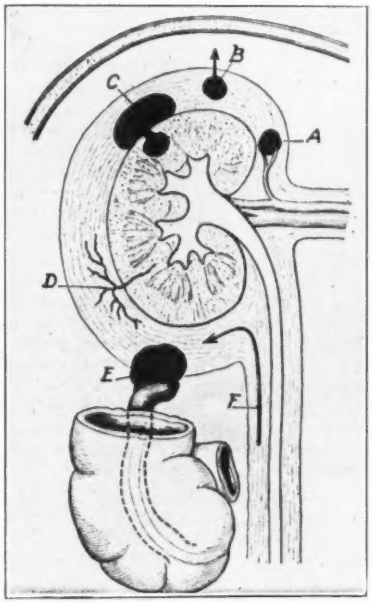

Fig. 1

Diagram to show sources of perinephritic abscess. *A*, hematogenous form, focus of infection elsewhere in body; *B*, extension of perinephritic abscess to subphrenic space; *C*, extension of infection from cortical abscess of kidney to fat around it; *D*, same as *C*, but by way of lymphatics; *E*, retrocecal appendical abscess extending to perinephric fat, and *F*, extension of infection from prostate, etc., along periureteral sheath. (From Eisendrath and Rolnick: Urology, Philadelphia, J. B. Lippincott Company, 1930, p. 690.)

calculi, tuberculosis, tumor or traumatic injury to the kidney, and 59 showed no primary lesion of the kidney. Boyd,[4] Delafield, Prudden and Wood,[5] Bell,[6] Power and Hala[7] all agree that perinephritic abscess usually results from extension of pus from rupture of a cortical abscess.

Mode of Infection of Perinephritic Fat.—As shown by Eisendrath and Rolnick (*Fig. 1*), there are five possible modes of infection which are enumerated under the diagram (A, C, D, E, and F). (B) represents extension of an existing perinephritic abscess to the subphrenic space. It is seen that a small cortical abscess (C) may give identically the same surgical picture as the metastatic form (A) and it may be impossible to decide which occurred. Rolnick[4] has recently shown that such infections may extend along the periuretheral sheath from the prostate, indicated by (F). In our series of 5 cases, all probably occurred as indicated by (A), except the fifth, which resulted from intrarenal infection (D).

Symptoms.—A careful history frequently discloses that abscessed teeth or a trivial skin infection has occurred several weeks previously or there may have been a definite boil, carbuncle, eczema, paronychia or other infected skin abrasion. Rolnick and Burstein[8] state that the triad of earliest cardinal symptoms consists of fever, high leucocytosis and tenderness in the costovertebral angle or in the flank. The fact that the urinary findings are at first entirely negative in most cases makes the diagnosis still more difficult. Usually the patient at first feels below par, is easily fatigued and perspires freely. (Our experience has been that sweating is a late manifestation.) According to Birdsall,[9] the condition may start with generalized aching pains with high fever and chills, but the temperature is usually slight, 99 to 100°, then gradually increases, becoming more septic in type. A dull aching pain in the flank noticed at first, later becomes more severe and is exaggerated on motions of the trunk or the leg on the affected side. Birdsall[9] states that the leucocyte count varies between 11,700 and 48,800, with an average of 24,700 in his series. Later, when tenderness is present, it is most marked below the twelfth rib in the kidney triangle or in the costovertebral angle and a sharp blow directly over the flank will elicit severe pain and tenderness. In the late stages a fluctuant mass in the flank may be seen and palpated, but the diagnosis should always be made before this occurs.

Diagnosis.—In addition to the history and signs of prolonged septic fever, high leucocytosis and costovertebral angle tenderness, the x-rays may show a delayed excursion or rigidity of the diaphragm on the affected side and the lateral border of the psoas shadow may be obscured. This was of great assistance in *Cases 1* and *4*.

Renal function tests, according to Birdsall,[9] are of value if the etiology is in the kidney itself. The excretion of the dye is diminished in kidney disease that involves regions other than the cortex. If the abscess is primarily in the cortex, the function test will be normal.

Typhoid fever, tuberculosis of the spine, and subphrenic abscess are frequently confused with perinephritic abscess and result in delayed drainage and subsequent marked kidney destruction. If perinephritic abscess is kept in mind, the diagnosis will seldom be missed. Two of our cases were treated for weeks by other physicians for typhoid fever, another for tuberculosis of the

spine, and still another died and was diagnosed only at autopsy.

Treatment.—The treatment consists of incision and drainage of the pocketed pus when definitely localized. Profuse sweating has been a valuable sign to us in determining whether localization has taken place. In some cases the diagnosis will be definitely in doubt as in *Case 3*, and it is far better to explore the peritoneal cavity with negative findings than to allow the patient to die of a ruptured, retrocecal appendix or a perforation of a perinephritic abscess into the general peritoneal cavity, as in *Case 5*. In *Case 5*, the passage of the stone, the flank pain, high fever and leucocytosis, together with the pus in the urine, should have pointed to the kidney in spite of the chest findings and the diabetes.

CASE REPORTS

Case 1.—Mr. F. M. C., age 48, complained of soreness and tenderness in the left kidney region on deep inspiration of four days' duration. Three weeks previously a small carbuncle of the neck had been excised and had healed promptly. His temperature was 100, pulse 100, and the white cells 11,600, with 71 per cent polymorphonuclears. The urine showed an occasional white cell, but six days later numerous white cells with frequent clumping. X-ray showed the left kidney slightly enlarged with a diffuse shadow. The patient's left diaphragm moved only slightly and was elevated. He continued to run a temperature from 100 to 102.4° in the afternoon and the tenderness persisted. He was hospitalized and continuous hot packs to the kidney region were instituted. His white count was 14,800, with 80 per cent polymorphonuclears. Three days later the left perinephritic space was explored and a large amount of thick creamy pus was removed from the region of the upper kidney pole. The cavity was irrigated with saline, aspirated and drained.

Case 2.—Mr. G. S., age 48, had complained of a dull aching pain in the right flank of several weeks' duration, diagnosed "typhoid fever." Preceding this illness several abscessed teeth had been removed and from them staphylococci were cultured. Examination showed moderate emaciation and tenderness on deep pressure in the right upper quadrant and right flank. When he was hospitalized, his physician ordered a barium enema, which showed a spastic colitis and irregularity around the hepatic flexure. His temperature was 102°, white count 13,000 with 75 per cent polymorphonuclears, and the urine negative. During his three day admission his temperature varied from 100.2 to 103°, at which time he was discharged. Eight days later he was readmitted by us with a diagnosis of appendical or perinephritic abscess. A right rectus incision revealed a small, infiltrated, retroperitoneal mass in the kidney region. After appendectomy, incision in the right flank revealed a moderate sized perinephritic abscess, which was drained.

Case 3.—Mrs. L. R., age 32, complained of soreness and pain in the right upper quadrant of one week's duration, gradually progressing. Three weeks before she had an acute diffuse cellulitis of the face which began as a "pimple" above the eye. The night before admission she had a chill. Examination showed moderate tenderness and rigidity in the right upper quadrant and right lumbar region. The temperature was 103°, pulse 140, white count 13,800, with polymorphonuclears 78 per cent, and her urine was negative.

Although the signs and symptoms were not clearly those of an acute abdomen, it was thought best to rule out acute appendicitis or cholecystitis. A right rectus incision showed the gallbladder, stomach and appendix to be normal. However, a firm, non-fluctuant, retroperitoneal mass was palpated in the region of the upper pole of the right kidney. Incidental appendectomy was done. Her temperature gradually approached normal, but on the tenth postoperative day it again became septic in type and reached 103°.

Two weeks later, a right perinephritic abscess was drained through the flank. She was transfused and the abscess was redrained nine days later, removing a cup of thick, creamy pus. Culture showed staphylococci.

Case 4.—Mrs. R. L. G., age 38, seen in consultation, complained of pain in the left flank, high septic fever of 98 to 103°, and profuse sweating. Two months previously a large carbuncle of the left forearm had been incised. When seen she had been sick for one month, diagnosed "typhoid fever." Examination showed pain and tenderness on pressure in the left kidney region. The white count was 16,000 and her urine, which had been clear, now showed considerable pus. Fluoroscopic examination showed a moderately rigid left diaphragm. Exploration of the left perinephritic space was advised, but was delayed by her physicians for ten days. When an exploratory operation was done by her local surgeon, two ounces of thick pus were removed from the region of the upper pole of the left kidney. Culture showed staphylococci. The abscess was redrained one month later for pocketing of pus.

Case 5.—Mr. C. A. B., age 24, complained of acute colicky pain in the left flank of two days' duration. During the previous year he had experienced three less severe attacks. One year before, he was admitted in diabetic coma with a blood sugar of 800 mg. He had passed an oblong kidney stone at home before admission. On admission, his temperature was 104°, pulse 160, respirations 30, and his urine showed no sugar, but was loaded with pus. His blood sugar was 222 mg. and his white count was 4,000, with 74 per cent polymorphonuclears.

X-ray showed the stomach and intestines filled with gas, obscuring any other details. In spite of regular insulin dosage, the blood sugar had remained around 235 mg. On the seventh day there were signs of pneumonia at the right base, accompanied by extreme abdominal pain on the slightest motion, which was inter-

preted as a referred pain from the chest. At this time his white count was 13,450 with 88 per cent polymorphonuclears and his temperature 103°. Eleven days after admission his chest had not cleared, he was vomiting almost constantly, and he died the following day. At autopsy a large perinephritic abscess was found on the anterior surface of the left kidney. This abscess had ruptured through a hole 1.5 cm. in diameter in the overlying peritoneum, causing a generalized peritonitis.

DISCUSSION

From the histories it is seen that our cases resulted from carbuncles of the neck and arms, abscessed teeth, and an infected papule of the face. Although the etiology of perinephritic abscess is usually metastatic, in *Case 5* the original focus must have been a pyonephrosis, which worked outward into the perinephritic space either through the lymphatics (*Fig. 1 D*) or by direct extension. This case was treated on the medical service entirely and the diagnosis was unsuspected until autopsy. The white blood count in these cases averaged 13,000, the temperature 102.6° and in all 5 cases there was definite costovertebral angle or right flank pain and tenderness on local pressure. In *Case 3,* the diagnosis was missed and the patient subjected to an exploratory laparotomy since her signs and symptoms were atypical. The perinephritic abscess was subsequently drained. In 3 cases the urine was negative, in one there was occasional pus ,and in the last the urine was loaded with pus. In 3 cases the pus from the abscess showed staphylococci. The others were not cultured.

Our presentation of these 5 cases of perinephritic abscess is made to remind the profession that the condition is not rare, is frequently missed for long periods and should always be kept in mind when there is prolonged temperature, high leucocytosis and costovertebral angle tenderness, especially with a history of skin infection, even though mild.

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STRABISMUS*

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I wish to present some slides showing the results that I have obtained by operating upon cases of strabismus. Before showing the slides, I shall very briefly review the subject.

Ocular deviations are either paralytic or non-paralytic. In paralytic cases the deviation is due to loss of function of the muscles involved. In non-paralytic cases the deviation is due to anomalies of the powers of convergence and divergence.

Non-paralytic or concomitant strabismus is the type of ocular deviation that can be corrected by operation. It is distinguished from the paralytic type by presenting a normal range of movement of each eye, and the same amount of deviation in all directions of gaze, while in the paralytic type the limitation of movement of the eye is present only in the field of action of the paralyzed muscle.

Concomitant strabismus is most often non-ocular, with one eye fixing and the other eye constantly deviating. More rarely it is alternating, with first one eye and then the other fixing, and always the non-fixing eye deviating. According to the direction of the deviation, we have two main groups: (1) convergent strabismus, when one eye deviates inward, and (2) divergent strabismus, when one eye deviates outward.

Convergent strabismus is much more common than divergent strabismus and usually develops between the first and fourth year of life, at the time when the child begins using its accommodation for seeing near objects. At first the deviation is usually periodic, being noticeable only at times, or being much worse at some times than at others. Later on it becomes constant. The mother usually attributes its development to some sickness or accident the child has had, but this is not the cause and is only incidental, or at most, an exciting cause. The underlying causes are:

(1) High refractive error, usually hyperopic in character.

(2) Difference in the relative strength of convergence and divergence.

(3) Defective fusion faculty.

*Read in General Clinical Session, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

Fig. 1, Case 1

Left—Before operation. Right—After operation.

J. S., age 18 years. Diagnosis: Marked convergent strabismus, with left eye fixing and right eye deviating inward. Operation: Resection of right external rectus and recession of right internal rectus.

Fig. 2, Case 2

Left—Before operation. Right—After operation.

A. Mc., age 10 years. Diagnosis: Marked convergent strabismus, with left eye fixing and right eye deviating inward. Operation: Resection of right external rectus and recession of right internal rectus.

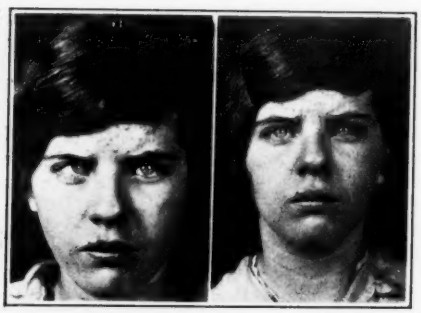

Fig. 3, Case 3

Left—Before operation. Right—After operation.

M. H., age 15 years. Diagnosis: Marked convergent strabismus, with left eye fixing and right eye deviating inward. Operation: Resection of right external rectus and recession of right internal rectus.

Fig. 4, Case 4

Left—Before operation. Right—After operation.

J. L., age 11 years. Diagnosis: Marked convergent strabismus, with left eye fixing and right eye deviating inward. Operation: Resection of right external rectus and recession of right internal rectus.

Fig. 5, Case 5

Left—Before operation. Right—After operation.

H. S., age 7 years. Diagnosis: Marked convergent strabismus, with left eye fixing and right eye deviating inward. Operation: Resection of right external rectus and recession of right internal rectus.

Fig. 6, Case 6

Left—Before operation. Right—After operation.

P. K., age 9 years. Diagnosis: Marked convergent strabismus, with right eye fixing and left deviating inward. Operation: Resection of left external rectus and recession of left internal rectus.

It is probable that most cases of convergent strabismus are caused by a combination of these factors, acting in the following manner: because of the hyperopia, a great amount of accommodation is necessary to see near objects, and as accommodation and convergence are closely associated acts, the child, as he increases his accommodation, increases his convergence, and if there is defective fusion faculty, one eye will turn inward.

Divergent strabismus usually begins in youth or early adult life, and is most often associated with myopia, or the loss of vision in one eye, the non-fixing or defective eye turning outward. In myopia very little accommodation is used and therefore there is little stimulus to convergence. The eyes assume a position of rest, namely, of divergence. The same is true when the vision of one eye is lost.

The family physician is usually consulted and he often advises that nothing be done about the strabismus, as the child will probably outgrow it. If every physician knew that when he gives such advice nine times out of ten he is sentencing the child to lose all useful vision in the deviating eye, he would never be guilty of it again. Please remember that we are not born with good vision, but develop it by using our eyes, and further, that if useful vision is ever obtained, it must be before the age of six or seven years, since the retina becomes fully developed at that time and is not capable of further development. An eye that deviates is never used, and therefore never develops useful vision, a condition known as amblyopia *ex anopsia*, or blindness from non-use. This can be prevented by proper treatment if begun soon enough. All physicians should advise patients with strabismus to go to a competent ophthalmologist as soon as the strabismus is noticed, where proper treatment may be given to develop vision in the deviating eye, proper glasses prescribed and, if necessary, an operation performed later on.

The three operative procedures which I use are:

(1) Recession, when the muscle is cut loose from its insertion on the eyeball and reattached farther back on the sclera, thus lengthening and weakening the action of that muscle.

(2) Resection, when the muscle is cut loose from its insertion on the eyeball, a portion of the muscle is excised, and the cut end of the muscle reattached at its original insertion, thus shortening and strengthening the action of the muscle.

(3) Tonotomy, when the muscle is cut loose from its insertion on the eyeball and is not reattached to the globe. I do this operation only on the external rectus muscle and never on the internal rectus. One, or a combination of these operations, is used on the muscles of one or both eyes, as the amount and kind of deviation warrants.

Lantern slides of twelve cases of convergent strabismus were shown, each slide showing a photograph of patient before and after operation. Two recent cases of this series were presented in person. Six of the most marked cases are shown here.

PRIMARY MALIGNANT NEOPLASM OF THE PANCREAS*

A CLINICAL STUDY OF EIGHTY-EIGHT VERIFIED CASES WITHOUT JAUNDICE

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and
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Disease of the pancreas, especially in the absence of jaundice or well defined tumor, or both, is one of the most difficult of upper abdominal lesions to diagnose. Recognition of such lesions is a definite challenge to the ability of the clinician, however experienced and alert he may be. Failure to reach a proper clinical diagnosis is largely due to the fact that the organ is deep-seated, rendering it comparatively inaccessible to the palpating hand, to surgical intervention or to roentgenologic studies. Moreover, there may be little or no gross evidence of impaired function, even in advanced stages of the disease, and fairly reliable tests of pancreatic function are too often found wanting. The invasive and compressive effect on adjacent structures of malignant pancreatic tumors, which are almost exclusively adenocarcinomatous in nature, often makes possible recognition of the lesion when all other diagnostic methods short of surgical exploration are indecisive.

Some conception of the anatomic relationship of the pancreas to contiguous organs may be gained from *Fig. 1*. The only structure that intervenes between pancreatic tissue and the surrounding viscera is peritoneum, since the pancreas has no true capsule. The head of the

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*From the Division of Medicine, The Mayo Clinic.

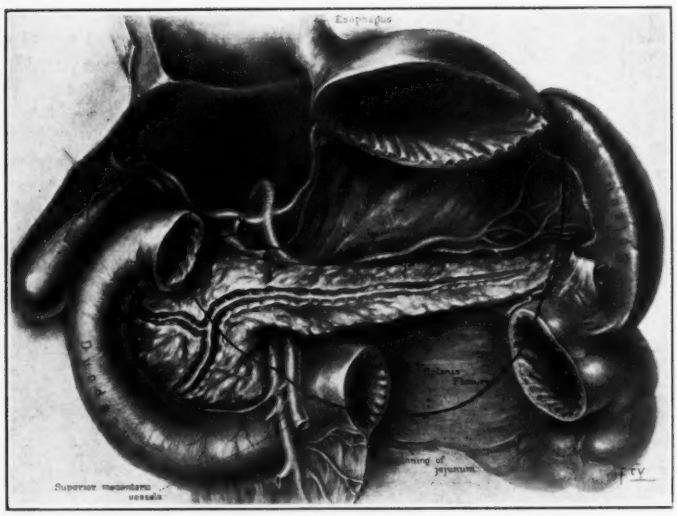

Fig. 1
Anatomy of pancreas and its anatomic relations. The outline of the stomach is superimposed.

gland is molded on the side of the duodenum; the anterior surface is in contact above and on the right with the beginning of the transverse colon, without even the interposition of peritoneum as a rule. The anterior surface of the body forms a considerable portion of the bed of the stomach, and is in contact with the pylorus. The left end of the body is in contact with the splenic flexure of the colon. The tail is in contact with the spleen and is in close relation to the left suprarenal gland and the left kidney. This intimate relationship of the gland to its neighboring structures argues for a close developmental connection, and one can readily see how gross and invasive lesions of this organ may involve the terminal end of the common bile duct and ampulla of Vater, the posterior wall and pyloric end of the stomach, the duodenum, the hepatic flexure of the colon, and the large blood vessels, including the portal vein.

During the period between 1921 and 1931, inclusive, approximately 403 cases of pancreatic carcinoma, verified by operation or necropsy, were seen in The Mayo Clinic. In this number of cases, 88 patients were without jaundice at the time they came under our observation, although 3 of these had previously undergone operation for relief of jaundice. It appears, therefore, that about one in 5 patients, actually 22 per cent, present themselves without jaundice, and may often be in an advanced stage of the disease when first seen.

MALIGNANT LESIONS OF THE PANCREAS WITH ASSOCIATED JAUNDICE

One may expect to find jaundice at some stage of the disease in carcinoma of the pancreas in about 80 per cent of all cases. One of us has recently shown that of all conditions for which surgical measures are undertaken for relief of jaundice, this entity ranks third in importance. In the presence of jaundice, the combination of late adult life (average age 56 years), recent onset of subjective disturbances and objective signs, epigastric pain or distress often with posterior radiation but with infrequency of severe colicky seizures, marked and progressive deterioration of weight and strength, high-grade bilirubinemia with a high, rising or fairly sustained pigment curve, when associated with a palpable gallbladder and repeated absence of bile on duodenal drainage, makes the diagnosis of the disease fairly easy. In a smaller group of cases, with only partial occlusion of the common bile duct, and in the absence of pain or palpable gallbladder, the condition may be confused with the purely intrahepatic forms of jaundice, or with silent stone in the common bile duct. The clinical picture of pancreatic carcinoma is indistinguishable from that of primary carcinomatous tumor of the terminal portion of the common bile duct, or of the ampulla or papilla of Vater, especially in the absence of ulceration and bleeding. In these cases the demonstrable involvement of duodenum, stomach or colon on roentgenologic examination is comparable to that of the non-icteric group which we shall presently consider.

A palpable, distended gallbladder is of great diagnostic significance, and it undoubtedly is present in the majority of cases in which this lesion is present when associated with persistent or progressive jaundice. In cases in which satisfactory examination of the abdomen is difficult, we have found it advantageous to admin-

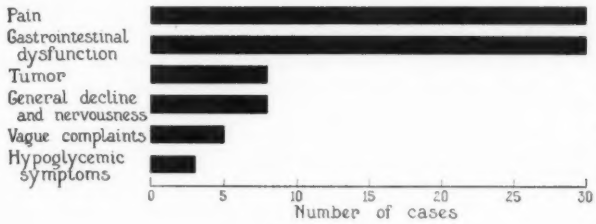

Fig. 2
Early symptoms.

ister, intravenously, from 3 to 5 grains (0.2 to 0.3 gm.) of pentobarbital sodium if there are no direct contraindications. Prompt and complete relaxation of the abdomen is thus accomplished, greatly facilitating the examination. In this manner it is possible repeatedly to palpate with assurance a distended gallbladder otherwise not detectable, and frequently the neoplasm as well. This drug is preferable to sodium amytal (sodium isoamylethyl barbiturate) for the anesthetic effect of the latter is unnecessarily prolonged.

MALIGNANT LESIONS OF THE PANCREAS, WITHOUT JAUNDICE

The 88 cases will be considered more in detail, for they obviously represent a condition more difficult of diagnosis than the group just considered, and they constitute a sufficient number of cases to furnish a clinical perspective. The early symptoms presented by these patients are listed in order of frequency in *Fig. 2*. In 30 of the cases pain was an early and major complaint. In a similar number, gastro-intestinal disturbances, usually of the flatulent type, were the initial symptoms. The significance of these two inaugural types of symptoms, especially when of recent onset, occurring in middle-aged or elderly patients, and in the absence of objective evidence of disease of the stomach, gallbladder, or colon, cannot be too strongly emphasized. In 8 cases a tumor was the first abnormality noted by the patient and in a similar number general, almost insidious decline in health, and nervous-

Table 1

PRIMARY MALIGNANT NEOPLASM OF THE PANCREAS: THREE CASES IN WHICH THERE WERE HYPOGLYCEMIC SYMPTOMS

Age, years, and Sex	Symptoms	Duration of Symptoms, Years	Weight, lbs.	Range fasting blood Sugar, Mg. in each 100 c. c.	Laboratory Studies	Associated Lesions	Operation and Pathologic Report	Comment
41 M*	Nine years of dyspepsia of gallbladder type. Attacks of weakness following long intervals between meals or strenuous exercise. Later, unconscious when he missed a meal. Controlled by use of sugar	1.5	25 loss	0.026 to 0.067	Gastric content: free hydrochloric acid 14 units; total acid 30 units. Roentgenologic study of stomach negative	Chronic cholecystitis with papillomas	At exploration, tail of pancreas hard and irregular; metastasis present in liver	Death 1 month after operation; at necropsy carcinoma of islands of Langerhans in tail and left half of body of pancreas. Metastasis to liver, intestines and lymph nodes
32 M	Slight ulcer symptoms for 14 months. Weakness and stupor with relief from ingestion of sugar	1	14 loss	0.04 to 0.12	Gastric content: free hydrochloric acid 48 units; total acid 60 units. Roentgenologic study of stomach and duodenum: polyposis of stomach and duodenal ulcer with slight obstruction	Duodenal ulcer with slight obstruction. Gastric polyposis	Removal of 3 small separate, distinct tumors from the pancreas. Adenocarcinoma of islands of Langerhans, graded 1	One year after operation in perfect health
45 M	Attacks of unconsciousness and headache	4	23 gain	0.04 to 0.103	No gastro-intestinal study	None noted	Cystic degenerating infiltrating adenoma of body of pancreas with probably 2 separate cysts. Carcinoma of islands of Langerhans	Nine months after operation no further hypoglycemic attacks

*Previously reported by Wilder, R. M.; Allan, F. M.; Power, M. H.; and Robertson, H. E.: Carcinoma of the Islands of the Pancreas. J.A.M.A., 89:348-355, July 30, 1927.

ness, were first recorded. We have been cognizant of the fact, recently emphasized by Yaskin, that in a small group of cases nervous and mental symptoms may be the initial and outstanding subjective features of the disease. This nervousness and mental irritability, or depression, may be so marked that the associated pain in the later stages, often demoralizing enough in itself, may be erroneously attributed to neurasthenia or its equivalents. In 5 cases the earlier symptoms were of a vague, indefinite, and sometimes misleading nature. In 3 cases the patients presented a typical hypoglycemic syndrome, ranging from eleven months to four years in duration. The more important clinical and pathologic features of these interesting cases are shown in *Table 1.*

In 17, almost 20 per cent of the 88 cases, there was a history of long-standing antecedent abdominal disturbance, which only added to our diagnostic difficulties, for these symptoms often indiscernibly merged with the symptoms eventually attributable to the malignant process. In 6 of these the dysfunction was of the type seen in disease of the gallbladder and 4 patients actually had gross cholecystic disease, 3 with multiple gallstones. One patient was operated on for cholelithiasis, at which time an early, asymptomatic carcinoma of the head of the pancreas was found. In 6 cases the dyspepsia simulated gastroduodenal ulcer, and 1 patient had an active, chronic, duodenal ulcer. The abdominal complaint of the five remaining patients was of a functional or indefinite character, but ranged from a few years to many years in duration. At operation, however, no lesion other than that in the pancreas was found.

The distribution by age was as follows: 3 of the patients were in the third decade of life (20 to 29 years of age, inclusive); 8 in the fourth decade; 13 in the fifth; 31 in the sixth; 28 in the seventh; and 5 in the eighth. The patients whose ages fall in the fifth, sixth and seventh decades of life (40 to 69 years of age, inclusive) comprised 72 per cent of the group of 88 patients studied. Sixty patients were men and 28 were women. It will be seen that, as in gastric carcinoma, men were in the majority, and this is true of all previous series studied. This fact implies that gallstones play a negligible causative part, if any, in malignant pancreatic tumors, for the incidence of cholecystic disease is much greater among women than among men. The age of 10 patients (11 per cent) was less than forty years (*Table 2*). These cases in spite of the early appearance of the disease are authentic, with 3 possible exceptions. In *Case 4* tissue for biopsy was not obtained, but the short duration of life, and the nature of death after operation, strongly supported the surgeon's opinion that the lesion was malignant. In *Case 9*, likewise, tissue for biopsy was not secured, so that the exact nature and mode of origin of the growth were not actually verified, but the surgical findings and early postoperative death supported the surgical diagnosis of malignant pancreatic lesion. In *Case 10*, that of a man 20 years of age, the pancreatic lesion may have been a highly malignant form of lymphosarcoma rather than an adenocarcinoma. With the exclusion of these 10 patients who were less than forty years of age, the average age of the other 78 patients was 55 years for women and 56½ years for men, an average which is almost identical with the figures of earlier studies.

SUBJECTIVE AND OBJECTIVE SYMPTOMS

In *Fig. 3* we have tabulated the noteworthy symptoms and findings on physical examination. Indigestion, pain or distress, loss of weight and strength, and tumefaction were of most frequent occurrence. It will be seen that in this nonicteric group there were many features that are noted also in cases of gastric carcinoma. The mode of metastasis was also identical. In contrast to gastric carcinoma, however, anemia and impairment of gastric motor function were less in evidence.

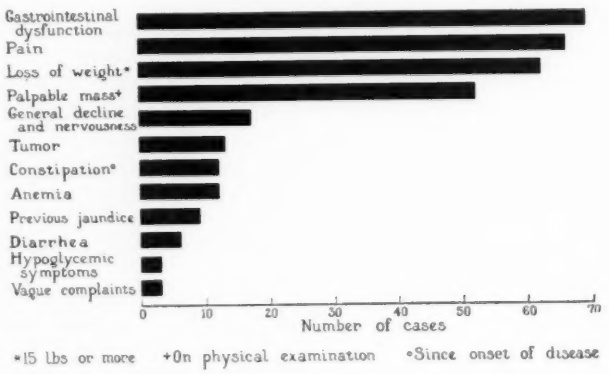

Fig. 3
Incidence of symptoms and signs.

The gastro-intestinal disturbances which figured prominently in 69 cases were nondescript in 52. Flatulence, usually of the gastric type, not provoked by aerophagia, was the outstanding type of dysfunction. Ulcer and cholecystic types of dyspepsia were present in 12 and in 6 cases, respectively. In 3 of the former cases there was associated duodenal ulcer, and in all 6 of the latter gross evidence of chronic cholecystitis, with or without gallstones, was found at opera-

Table 2

PRIMARY MALIGNANT NEOPLASMS OF THE PANCREAS: PATIENTS LESS THAN FORTY YEARS OF AGE

Case	Age, Yrs. and Sex	Duration and Nature of Symptoms	Significant Findings on Physical and Laboratory Examination	Clinical Diagnosis	Significant Surgical and Histopathologic Findings: Comment
1	39 F	Duration 15 months. Epigastric movable mass, gradual enlargement. For 5 months local soreness and severe pressure after long automobile rides	Large, nonsensitive mass in right upper abdominal quadrant. Hemoglobin 50 per cent	Hepatic cyst	Carcinoma of head of pancreas with extensive metastasis to liver. Adenocarcinoma, graded 4. Death 2 years after operation.
2	38 M	Duration 8 months. Influenza and pneumonia, followed by painless jaundice. Cholecystectomy; disappearance of jaundice. Persistent external biliary fistula for 4 months; then gastro-enterostomy. Loss of 50 pounds	Epigastric mass and cachexia. Alkalemia with tetany. Free hydrochloric acid in gastric content 16 units. Gastric roentgenologic examination negative	Carcinoma of pancreas	Inoperable carcinoma, probably primary in the pancreas. Tissue from stomach and liver: adenocarcinoma. Necropsy: carcinoma head of pancreas involving peritoneum and liver. Obstruction of papilla of Vater
3	36 F	Duration 6 months. First 3 months, aching lower abdominal pain. Then shift to upper part of abdomen, with aching and "tearing" pain at both costal arches, worse at right. Aggravation of pain in prone position. Anorexia, belching and constipation. Loss of 26 pounds	Hard, irregular, somewhat movable and tender mass in left upper abdominal quadrant. Gastric roentgenologic examination negative	Carcinoma of pancreas	Carcinoma of body and tail of pancreas. Adenocarcinoma.
4	33 M	Duration 4 months. Periodic flatulency and upper abdominal cramps, left more than right. Posterior radiation. Loss of 40 pounds. Transient recent jaundice.	Tenderness in right upper abdominal quadrant. Deformity of duodenal bulb on roentgenologic examination.	Duodenal ulcer	Marked enlargement of pancreas, irregular, nodular. Cholecystectomy. No tissue. Death 1 year after operation.
5	33 M	Duration 6 months. Ache in infra-umbilical region. Abdominal cramps. Increasing constipation. Loss of 16 pounds	Movable hard mass just above and to left of umbilicus. Gastric roentgenologic examination: mass extrinsic to stomach	Tumor in left upper quadrant of abdomen	Large, hard mass involving entire pancreas. Small-celled carcinoma, graded 4
6	32 M	Duration 1 year. Ulcer and hypoglycemic syndrome. No pain. Loss of 14 pounds	No mass. Blood sugar 0.04 mg. in each 100 c.c. Free hydrochloric acid in gastric content 48 units. Gastric roentgenologic examination: duodenal ulcer and gastric polyposis.	Hyperinsulinism	Tumor 1.5 cm. in diameter at the juncture of body and tail of pancreas. Another one, 2 cm. in diameter, 2.5 cm. above. Duodenal ulcer and gastric polyposis. Adenocarcinoma, graded 1
7	30 M	Duration 2 years. Progressively severe pain in left costal margin and epigastrium. Relief by defecation. Questionable mass. Loss of 15 pounds	Hard, somewhat mobile mass in epigastrium. Free hydrochloric acid in gastric content, 64 units. Gastric roentgenologic examination: extrinsic mass.	Cyst of pancreas	Tumor of pancreas, with generalized intraperitoneal carcinoma. Carcinoma. Suicide 6 months later
8	24 F	For 3 years, two to five times a year, vomiting episodes, average duration of 1 week. Loss of strength. No loss of weight	Questionable ascites. Indefinite mass in epigastrium. Hemoglobin 76 per cent. Negative gastric roentgenologic examination	Mass in upper portion of abdomen. Possible cyst of pancreas	Exploration: carcinoma of pancreas. Nodes along gastrohepatic omentum disclosed adenocarcinoma
9	22 M	Five weeks dull aching pain in left upper quadrant; tender mass same situation. Loss of 13 pounds	Firm, smooth, tender, fixed mass in left upper abdominal quadrant 8 cm. in diameter. Hemoglobin 75 per cent. Roentgenogram of colon: extrinsic mass	Upper abdominal tumor, indeterminate nature	Exploration: intra-abdominal tumor 15 cm. in diameter of malignant, cystic nature, involving pancreas. Death 5 months after operation
10	20 M	Five years of intermittent gastric disturbance simulating ulcer. Three months of anorexia, emesis, loss of weight and strength. Epigastric mass 3 weeks. Loss of 24 pounds	Moderate cachexia. Left epigastric mass (8x10x12 cm.), movable with respiration. Hemoglobin 54 per cent; erythrocytes 3,900,000. Extensive filling defect of body of stomach. Probable lymphosarcoma of stomach	Malignant lesion of stomach, probably lymphosarcoma	Exploration of tumor of pancreas involving posterior wall of stomach. Lymphosarcoma, graded 4, or very cellular carcinoma

tion. In 5 cases the subjective disturbances were confined to the intestinal tract. One patient exhibited only a retention type of vomiting, due to involvement and obstruction of the duodenum. Exclusive of cases in which there is mechanical obstruction of the stomach or duodenum, one gets the impression that the pancreatic lesion produces mild to moderate ileus, especially of the upper part of the digestive tract. This may sometimes exclusively implicate the colon. It seems reasonable to presume that this ileus may in part be due to pressure of the tumor on regional nerves or blood vessels, or to involvement of the organs themselves.

Although the presence of a tumor, first discovered by the patient, was an early feature in 13 cases, it was eventually noted in 52 (60 per cent) on physical examination. This fact greatly facilitated the diagnosis. The pancreatic tumor is more frequently palpable in the non-icteric cases, whereas in the cases in which there is jaundice the distended gallbladder, or the enlarged liver, or both, are more in evidence. The situation of 46 of the 52 tumors was accurately recorded in the case histories. Half of these were in the epigastrium, 4 extending somewhat to the right or left; 11 were in the left upper abdominal quadrant; 7 in the right upper abdominal quadrant, and 5 in the region of the umbilicus. Almost half of all the tumors were considered somewhat movable. That such a large percentage were recorded as movable is a striking clinical feature, since pancreatic tumors are generally regarded as immobile.

At operation the surgeon failed to record the site of the involvement in 18 of the 58 cases, but in the remainder the situation was as follows: head, 33; head and body, 4; body, 15; body and tail, 4; tail, 9; and diffuse, 5.

Glycosuria and diarrhea, especially steatorrhea, were conspicuous by their infrequence. This fact is of clinical interest because it is contrary to the generally accepted belief that the stools in pancreatic disease are bulky, frequent, and have a high content of fat. Even a Schmidt-Strassburger diet, and generous amounts of partly cooked beef, as suggested by Garrod, failed to produce excess fat or undigested muscle fiber in the stools of the majority of the patients examined. Of course, when examination reveals these abnormal findings in the feces, disease of the pancreas is most likely.

Since the lesion in carcinoma of the pancreas is comparatively inaccessible and irremovable, surgery has little to offer for the patient, exclusive of relieving jaundice and its distressing accompaniments, and thereby often prolonging life and comfort. This is in contrast to the results which may be obtained in surgical treatment of acute and chronic inflammatory lesions, cysts, and benign tumors of the pancreas.

Pre-existent jaundice in 9 cases was ascribed to antecedent or coexistent disease of the biliary tract in 6, and to pancreatic carcinoma in 3. In the latter 3 cases, the patients had undergone surgical interference prior to coming under our observation, ostensibly in order to overcome the obstructive jaundice, and gave no evidence of jaundice on admission. Therefore, they were included in the non-icteric group for study.

When one has seen and followed a large number of cases of pancreatic carcinoma, it is obvious in the majority that either the disease runs a rapid clinical course or is well advanced before symptoms are sufficiently urgent to require medical relief. In 50 per cent of the cases included in this study, the duration of symptoms was less than six months, and two-thirds of patients who underwent surgical exploration had succumbed to the disease within six months.

PAIN IN CARCINOMA OF THE PANCREAS

The character of the pain, its situation and severity, in carcinoma of the pancreas, are variable and depend on the situation of the lesion, the duration of the symptoms, and the presence or absence of associated disease of the stomach, duodenum or biliary tract. Sixty-six (76 per cent) of the patients in this series presented pain as a symptom. It is noteworthy that in one of 4 of the cases reviewed, pain was not complained of at any time prior to the registration of the patient at the Clinic, and on the other hand, in 30 (35 per cent) of the cases pain was the initial and outstanding symptom of the disease.

Situation.—Mussey, in 1919, in reporting 90 selected cases of carcinoma of the pancreas seen in the Clinic, noted that pain was the outstanding feature and chief complaint in 44 per cent. The series studied by him included cases of carcinoma of the pancreas, with jaundice and without, and pain occurred in all but 10 of the cases (88 per cent), which figure is somewhat higher than that in the present series of cases without jaundice. It is generally considered that the characteristic pancreatic pain is deep at the left costal arch, passing around or through to the left subcapsular region, but as a matter of fact the pain is variable in situation, as previously pointed out by one of us. In the majority of cases in this series the pain was in the

epigastrium, and in an almost equal number it was in the upper part of the abdomen or in one of the upper abdominal quadrants, more often on the left side than on the right. In 10 of the cases the lower part of the abdomen was the site of the pain, whereas in 3 cases general abdominal pain was complained of. In 2 of the cases pain and aching were present in the back, without any associated abdominal pain. Other more unusual sites for pain were the left anterior axillary line, left loin, and right flank. In those cases in which the carcinoma was in the body or tail of the organ, the pain, if on either side, was generally on the left, while the reverse was true of lesions in the head of the pancreas, in which pain was generally on the right. In a few instances, pain was present in two distinct situations in the same case, but shifting of the pain was infrequent.

Radiation.—Radiation of pain in cases of carcinoma of the pancreas is surprisingly frequent. In 62 cases in this series, presence or absence of radiation of pain was reported. In one-third of this number of cases pain radiated into the back, either directly through to the back or around the costal margins to the back. This is comparable to Mussey's figure of 32 per cent, in which radiation of pain to the back occurred. Mussey reported that in 55 per cent of cases of gallstones there was radiation of pain to the back. In an equal number (one-third) there was absence of radiation of pain. In 9 cases, pain radiated into one of the upper quadrants of the abdomen; in 4, to the right, and in 5, to the left. Other sites to which pain radiated were the right shoulder and upper part of the abdomen (two each) and to the lower lumbar region, bladder, axilla, right flank and anterior part of the thorax (one each).

Type.—The pain in carcinoma of the pancreas is often spoken of as a deep, dull, boring pain, of moderate severity and fairly constant, but the type and severity of this pain may be as variable as its situation. In 46 of the cases in this series the nature of the pain is recorded in the history. In the largest number of cases (16) the pain was characterized as a dull ache. Following are the other types of pain noted: cramping in 6 cases, gnawing in 4, ulcer-like in 4, soreness in 4, sharp in 3, distress in 3, colicky in 2, and shooting, acute, tearing, miserable, and gallbladder type of pain, one each. In several instances the lower abdominal pain was of a colicky type, directly related to function of the large bowel, and presumably caused by colonic irritation, probably the result of direct pressure of the tumor on the colon, or to interference with the nerve supply of the colon as a result of pressure. The intensity of the pain was recorded as severe in 19, moderately severe in 24, and mild in 9. The pain in cases in this series was much more often constant than intermittent, and it was usually unaffected by the events of the normal digestive cycle. The occurrence, or exaggeration, of the pain at night was also characteristic.

Associated Lesions.—In the presence of associated disease of the gallbladder, or peptic ulceration, the pain complained of was generally characteristic of these conditions, and was often of such severity and frequency as to overshadow any painful symptoms that might have been produced by the pancreatic neoplasm. The absence of pain in some of the cases may perhaps be accounted for by the early development of other prominent symptoms, such as obstruction of the duodenum, rapid loss of weight and strength, hyposensitivity to pain, or slow growth of a tumor, which was eventually palpated by the patient or his physician.

The features which can be said to be most typical of the pain in this series were its epigastric situation, with radiation to the back, its dull, aching character, its moderate severity; the fact that it was rather constant, worse at night, and its steady progress, rather unrelated to the normal events of the digestive cycle.

LABORATORY FINDINGS

The results of analyses of gastric content were of little significance, with two exceptions. Thirty per cent of 57 patients who underwent this examination had achlorhydria, and 12 per cent had gross gastric retention caused by involvement of and obstruction of the duodenum. As previously stated, anemia was infrequent, occurring in only 13 per cent of the entire group. This was probably due to two factors: lack of an ulcerating, oozing surface, such as one sees in carcinoma of the gastro-intestinal tract, and dehydration of the blood. The results of the laboratory studies are summarized in *Fig. 4.*

The roentgenologic findings were most instructive and are enumerated in *Table 3.* Of chief significance were the following: in 32 of the 68 cases in which studies of the stomach and duodenum were made, abnormal findings were reported. These consisted of: (1) filling defects properly interpreted as masses extrinsic to the stomach; (2) duodenal obstruction, invariably occurring in the second portion of the organ; and (3) duodenal displacement to the

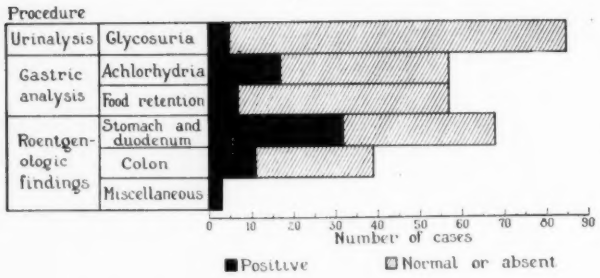

Fig. 4
Results of laboratory studies.

right. Of 39 patients who underwent roentgenologic study of the colon, 11 presented defects interpreted as masses extrinsic to the colon.

TYPES AND METASTASIS

Histologic examination of tumor tissue removed at operation in 28 cases disclosed carcinoma, graded 4 in malignancy, in 43 per cent. This, in part, accounts for the rapid clinical course of the disease, as previously mentioned. Five of the tumors were cystic, several cysts reaching good size. Three were islet tumors that had undergone carcinomatous transformation, 2 being of low grade. Two were classified as lymphoblastomas, one of which was possibly a reticulum cell sarcoma. In one case a glioma was suspected. In the group of cases in which operation was performed, metastasis was discovered at operation in 52 per cent. The sites of metastasis, in order of frequency, were liver, regional lymph nodes, peritoneum, omentum, pelvic organs, mesentery, and stomach.

Table 3

PRIMARY MALIGNANT NEOPLASMS OF THE PANCREAS: ROENTGENOLOGIC STUDIES

	Cases
Stomach	
Negative	36
Mass extrinsic to stomach	8
Mass extrinsic (apparently head of pancreas)	2
Carcinoma of stomach	23
Atypical pyloric deformity	1
Indeterminate	2
Duodenum	
Negative	36
Duodenal obstruction	1
Duodenal obstruction (second portion)	5
Duodenal obstruction 7.5 cm. distal to pylorus	1
Duodenal obstruction 10 cm. distal to pylorus	1
Duodenum pushed to right (enlarged head of pancreas)	2
Duodenal ulcer	6
Colon	
Negative	28
Mass extrinsic to colon	9
Mass extrinsic to colon below splenic flexure	1
Apparent obstruction at splenic flexure	1
Miscellaneous	
Flat plate of abdomen	
*Calcified shadows	1
*Soft tissue shadows	1
Lungs: metastasis to lungs	1

*Proved at operation to be pancreatic in origin.

SUMMARY

In a study of more than 400 verified cases of primary pancreatic carcinoma, jaundice was absent in about 20 per cent. Even in the latter cases the tumor most frequently involved the head of the pancreas.

There is no syndrome characteristic of the disease. Significant early symptoms were pain; gastro-intestinal dysfunction of a nondescript, flatulent type; tumor; rapid decline in general health, and nervousness.

The outstanding late symptoms and signs, in order of frequency, were gastro-intestinal dysfunction; pain, chiefly upper abdominal; marked loss of weight and strength; presence of a palpable mass, and nervous manifestations. Three of the patients presented a syndrome of hypoglycemia.

Pain was most frequently steadily progressive, epigastric in situation, with radiation to the back, and was characterized as a constant dull ache of moderate severity, worse at night, and rather unrelated to the normal events of the digestive cycle.

In the majority of cases the clinical course was rapid and progressive. This is accounted for in part by the highly malignant nature of most of the lesions.

There was a striking absence of steatorrhea in this series and anemia was uncommon.

The high incidence of cases in which tumors were palpated and the frequency of their apparent mobility was an interesting clinical feature.

Roentgenologic studies of stomach, duodenum and colon proved to be the most valuable of the diagnostic laboratory procedures. In a considerable number of cases, duodenal deformity, obstruction and displacement, and extrinsic colonic and gastric masses were demonstrated.

Tests of pancreatic function proved of limited diagnostic value in those cases in which the tests were carried out.

Since the lesion is irremovable, the ultimate prognosis in pancreatic carcinoma is hopeless. Metastatic involvement of other organs was

found in more than half of the cases at the time of surgical exploration.

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[EDITOR'S NOTE.—Discussion of this paper will follow paper of Dr. Daniel N. Silverman, "A Consideration of Our Present Knowledge Concerning the Pancreatic Ferments," in the next issue of the JOURNAL.]

TETANY CALCIPEXICUS OF THE NEW BORN INFANT*

PRELIMINARY REPORT

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and
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An increasing number of reports of spasmophilia occurring in the new born infant have appeared recently.[1] Considerable discussion has developed as to whether these new born infants have tetany similar to that occurring most frequently between the age of two months to two years.

In the diagnosis of the cases reported great stress has been given to the occurrence of the spastic contractures of the upper and lower extremities and a positive Chvostek facialis sign. Hyperactive reflexes, a high pitched cry and an occasional moderate amount of edema have been noted. In the majority of cases reported there have appeared no blood calcium studies or electrical hyperirritability tests. The few blood calcium determinations reported for the most part show values ranging from 8 to 10 mg. of calcium per 100 c.c. of blood serum, these values being slightly higher than those associated with tetany in older infants. Recently Mitchell and Stevenson[2] have deemed it advisable to call attention to the fact that the diagnosis of infantile tetany should not be made in the early weeks of life on the basis of a positive Chvostek's facialis sign and there should be further proof of a lowered blood calcium or the electrical reactions characteristic of tetany being present.

The purpose of these case reports is to increase the available information with regard to spasmophilia occurring in the new born infant. Special attention has been paid to the calcium relationship in the blood of one infant and his mother. Essential differences in this infant and older infants showing classical tetany will be pointed out and the possible mechanism for the production of these differences will be discussed.

*Received for publication December 19, 1932.

REPORT OF CASES

Case 1.—This case is briefly reported because of lack of calcium blood studies. Baby K., a male infant, age one hour, was first seen by Dr. Herman Johnson who had delivered the child. Dr. Johnson stated that delivery was difficult and the cord was wrapped about the infant's neck several times.

At birth the child weighed 8 lbs. 1 oz. When he was first seen he was cyanotic and breathing at intervals. He seemed to have considerable trouble in swallowing, becoming cyanotic and having considerable mucus in his throat. Reflexes were sluggish, there was no Chvostek's sign, and the fontanelle was not bulging. The infant was at once given 25 c. c. of whole blood intramuscularly from his father.

Thirteen hours after delivery involuntary twitching was noted. Fairly hard convulsions began nineteen hours after birth. There was no bulging of the fontanelle at this time. Reflexes were exaggerated. There was a positive Chvostek's facialis sign. Trousseau's sign was not elicited. Calcium gluconate and sodium amytal were given to the infant. The child was extremely restless, and the nurse on the case noted the baby was "crying heartily and the feet were jerking almost constantly." Calcium gluconate was continued intramuscularly and calcium chloride given by mouth. On the third day the infant's temperature increased to 101.5° and on the fourth day both drums were incised and purulent material obtained. Muscular twitching stopped twenty-four hours after calcium therapy was started, but the infant continued to have attacks of cyanosis. After the ear drums were incised the temperature came to normal. The fontanelle at this time was noticed to be bulging slightly.

The child continued to improve, was circumcised and about ready for discharge from the hospital when he began having loose stoo's and vomiting. Muscular twitchings again were noted and the Chvostek's sign was markedly positive. Calcium therapy controlled the muscle twitching but the child continued to vomit. The fontanelle showed no increase in pressure. X-ray of the stomach showed a marked retention of the barium meal after four hours. Atrophine seemed to have little effect so a pyloroplasty was done by Dr. E. W. Bertner. At operation no pyloric tumor was found. The child died shortly afterwards and at autopsy there was found that part of the mucosa of the stomach at the duodenal end had herniated into the pylorus producing a ball-in-socket valve which we thought accounted for the gastric retention and vomiting. Ex-

amination of the brain showed no evidence of any intracranial injury.

Case 2.—Thomas H., a male infant, age two hours, was first seen with Dr. H. J. Ehlers who had delivered the child. Dr. Ehlers stated that shortly after birth the child began to have some difficulty in breathing and was having spastic contractures of the upper and lower extremities shortly afterwards.

The infant was delivered at full term of a primipara, age 24 years, the mother being in labor five hours. At birth the infant weighed 8 lbs. 14 oz. The mother stated, on questioning, that the day before the infant was delivered she felt "a little nervous." Shortly before the child was born the mother's blood pressure increased slightly. She had no albumin in her urine and otherwise seemed well. At delivery the obstetrician noticed nothing abnormal in the placenta.

When the infant was first seen he was having almost continuous spastic contractures of the upper and lower extremities. He was attempting to cry and was having poor success though every now and then he was able to produce a rather high, disturbing cry, showing considerable apprehension.

The temperature of the infant was 98.8° though shortly afterwards his temperature went to 100.5°. He was perfectly developed and showed no increase in pressure in the anterior fontanelle. Briefly the positive physical findings were: (1) almost continuous spastic contractures of the upper and lower extremities; (2) sharp cry; (3) increased reflexes; (4) positive Chvostek sign; (5) a positive Weiss sign; and (6) a moderate elevation of temperature.

Venipuncture of the external jugular vein was at once accomplished and 20 c. c. of blood taken for calcium studies. After the blood was obtained the infant was given 2 c. c. of calcium gluconate intravenously with 30 c. c. of 5 per cent glucose. Calcium therapy was ordered intramuscularly and intravenously every eight hours for the first twenty-four hours. A sedative, sodium amytal, was given by mouth.

The infant did well and became much quieter until about eighteen hours later when he began having attacks of cyanosis and difficulty in breathing. At this time it was noticed that his anterior fontanelle was bulging and under considerable pressure. Oxygen therapy was started but it did little good. Shortly after, he had to be placed in a Drinker respirator. At this time the infant's temperature was 100.5°. The respirator helped, but the cyanosis increased and his periods of voluntary respirations became further and further apart. The pressure on the anterior fontanelle seemed to be increasing slowly. At this point it was decided to do a lumbar puncture as the intracranial pressure was becoming incompatible with the child's life. Between two attacks of difficulty in breathing the infant was taken from the respirator, placed in a position in an effort to attempt to prevent any herniation of the brain and a lumbar puncture done. Twelve c.c. of fluid were withdrawn slowly and the infant returned to the respirator. He seemed much improved shortly thereafter and the attacks of cyanosis and difficulty in breathing became further apart. From this point on recovery was uneventful. Calcium therapy was continued by mouth and intramuscularly.

The infant held his weight for three days and then suddenly lost eight ounces and the following day three ounces, from which point he has made a steady gain. The temperature never went above 100.8° for the first four days and then dropped to normal. It is believed that the stationary weight for the first three days represents the infant as having a slight amount of edema. On the third day the pressure of the infant's fontanelle seemed normal. Now at two months of age the child is a normal infant, weighing 13 pounds. His length is 61 cm., his head measures 40 cm., and his chest 39 cm. Needless to state this infant has received calcium therapy continuously.

The laboratory examination of the spinal fluid showed in the first specimen 1,080 red blood cells per c.c. and the second specimen showed 1,030 red blood cells per c.c., white blood cells 9 per two c.c. The Bence Jones reaction was faintly positive; the Pandy reaction 1+, Froin's syndrome negative, and sugar negative. The urine on the third day was clear, straw colored, acid, showed no albumin, no sugar, no acetone, no diacetic acid, no casts, a few urate crystals, a few white blood cells—4 to 6 per high powered field and a few red cells, 1 to 3 per high powered field.

Blood for calcium studies was taken from the child and his mother and the following results were obtained:

MOTHER

Specimen Taken

	2 Hours	5 Days	2 Months
Total calcium	9.2 mg.	9.7 mg.	10.9 mg.
Diffusible calcium	7.6 mg.	7.0 mg.	5.7 mg.
Per cent diffusible calcium	82.5	72.1	54
Phosphorus	4.3 mg.	4.0 mg.	4.0 mg.
Albumin	3.5 mg.	3.8 mg.	4.6 mg.
Globulin	1.3 mg.	1.3 mg.	1.6 mg.

INFANT

Specimen Taken

	2 Hours	5 Days	2 Months
Total calcium	9.1 mg.	11.2 mg.	11.7 mg.
Diffusible calcium	8.8 mg.	9.0 mg.	6.3 mg.
Per cent diffusible calcium	96.6	80.3	54
Phosphorus	5.9 mg.	7.2 mg.	7.4 mg.
Albumin	——	3.3 mg.	4.6 mg.
Globulin	——	1.6 mg.	0.6 mg.

The blood chemistry studies are done by one of us (H. O. N.) in the Department of Chemistry of the Rice Institute, employing the Nicholas[3] method of obtaining diffusible serum calcium by high pressure ultrafiltration.

COMMENT

The concentration of normal diffusible calcium is somewhat higher by the method of Nicholas[3] than that obtained by low pressure ultrafiltration technic such as that of Greenberg and Gunther.[4]

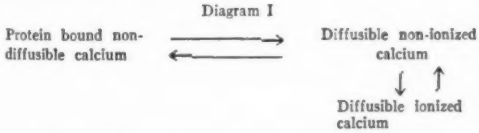
A number of investigators have reported on the normal maternal and fetal serum calcium. Mull and Bill[5] found in a series of 24 observations on the cord blood and venous blood at delivery that the cord (infant) serum calcium averaged 11.6 mg., and the venous (mother) averaged 10.2 mg. of calcium. The values of the cord blood were in every case higher than those of the corresponding maternal blood throughout the entire series. The diffusible portion of the maternal serum calcium has been

found by Watchorn and McCance[6] to be increased approximately 14 per cent. Nicholas[7] finds there is an increase in the diffusible calcium during the later months of pregnancy. He[7] also found that in a series of normal infants the concentration of the calcium in the infant's blood is slightly higher than that in the mother's blood and the diffusible calcium is slightly lower than that in the maternal blood. This fact is apparently borne out by the total and diffusible calcium values found by Ray and Phatak[8] in a series of 32 new born infants. In this series the total serum calcium averaged 11.4 mg. per 100 c.c. of serum and the diffusible calcium averaged 5.3 mg. (46.7 per cent) per 100 c.c. of serum. Ray and Phatak employed the technic of Greenberg and Gunther so the average diffusible serum calcium of these infants is lower than the normal adult. In brief, the blood calcium of the mother should bear normally to her infant the following relationship: the mother's total blood calcium is slightly lower than that of her child but her diffusible calcium is somewhat higher than that of her infant.

DISCUSSION

The most striking facts obtained from the above data are: (1) the exact reversal of the normal mother-to-infant calcium relationship; (2) the extremely high diffusible calcium in the serum of the infant and (3) the high diffusible calcium concentration in the maternal serum. It must be recognized that in this infant there has been a severe disturbance of the calcium equilibrium involving the calcium that is bound to protein and the diffusible calcium. To understand this disturbance the following calcium mechanism must be considered as existing to explain the spasmophilia similar to tetany occurring in this infant and that occurring in the older infants normally known as tetany.

Diagram I



The components of the above mechanism are normally in an equilibrium suitable for supplying ionized calcium in sufficient concentration to be utilized to prevent tetany or spasmophilia. The fact that all the calcium may be precipitated as calcium oxalate merely by adding an excess of ammonium oxalate to serum would speak for an equilibrium between the bound and free calcium which tends to go to completion in one direction, namely: the formation of free calcium ions when any reagent is added which removes calcium ions as soon as they are formed. At present it is unfortunate that there is no reliable method for measuring the actual calcium ion concentration of the serum or plasma, though several formulas have been proposed for calculating calcium ion concentration. Therefore, the above calcium mechanism must represent the correct relationship of the different forms of calcium if it is true that calcium ions in certain concentration are necessary to prevent neuromuscular irritability, and that there is a mechanism available in the body for maintaining normal relationships and values of calcium. Providing these assumptions are not granted the calcium values in this infant presenting the classical picture of tetany indicate a difference in total and diffusible calcium concentrations from these values found in infantile tetany occurring in older infants by Pincus, Petersen, and Kramer[9] and Gunther and Greenberg.[10] In view of this fact the above mechanism furnishes the easiest means to explain why this infant developed convulsions identical with those of tetany observed in older infants.

Total and diffusible calcium values in infantile tetany and experimental tetany parathyroipriva are available. Pincus, Petersen and Kramer[9] have reported diffusible and total calcium concentrations in three instances of infantile tetany, and in experimental tetany parathyroipriva. Their results indicate that in both parathyroid tetany and infantile tetany there is a marked decrease in the total and free calcium of the serum though the two conditions according to these authors are not the same for the following reasons. In tetany parathyroipriva the inorganic phosphorus concentration was increased in every instance, sometimes as much as 100 per cent. In infantile tetany inorganic phosphorus was not increased. In addition, ultraviolet irradiation does not increase diffusible calcium in tetany parathyroipriva. Apparently in infantile tetany there is a decrease in the total calcium leading to a disturbance in the calcium that is available for diffusion. Free or diffusible calcium is thus lowered and the concentration of calcium ions is reduced. In tetany parathyroipriva ionization of the free calcium can be increased apparently by ultraviolet irradiation but the amount of calcium that is diffusible remains unchanged.

Thus Pincus, Petersen and Kramer[9] were able to keep parathyroidectomized dogs alive for some time and free from convulsive seizures by irradiating them with the mercury quartz lamp. These dogs showed no change in the total or diffusible calcium values. Apparently this indicates that the concentration of ionized calcium in the diffusible portion of the blood calcium had been increased by this therapy but the total diffusible portion not increased.

Gunther and Greenberg[10] state that diffusible calcium values of 3.5 mg. per 100 c.c. or less in their experience are associated with clinical symptoms of active tetany. These investigators report also on tetany due to hyperventilation. They found the diffusible calcium was not at all decreased but even showed a slight increase. They then concluded that tetany due to an alkaline shift in the acid-base balance is probably not associated with a lowering of the concentration of ionic calcium (that is, not a lowering of the concentration of the diffusible portion of calcium). We wish to call attention to the observation that due to chemical changes in the blood following hyperventilation, the concentration of the ionic calcium was probably decreased, and the increase in diffusible calcium represents an attempt by the body to supply by mass action more calcium ions to prevent neuromuscular irritability.

Alteration of the concentration of one of the components pictured in *Diagram 1* will result in changes in the concentration of the others in an effort to produce by mass action sufficient available calcium for nervous tissue utilization. It is thought that the concentration of the calcium ions in the serum of this infant and his mother were reduced by the presence of some substance produced in the placenta. It is conceivable also that chemical changes in the blood of the infant at birth rendered the diffusible calcium less ionic. The high diffusible calcium represents an attempt then by mass action of sufficient diffusible calcium to produce a high enough concentration of calcium ions to prevent neuromuscular irritability. Spasmophilia may be due not only to a diminished total and diffusible serum calcium concentration (as for example in infantile tetany or in tetany parathyroipriva), but also to a lowered calcium ion concentration even in the presence of a high diffusible calcium and fairly high total calcium concentration. This is borne out by the tetany occurring in this infant (T. H.) and tetany due to hyperventilation as reported by Gunther and Greenberg.[10]

Thus it will be true that in spasmophilia of the new born infant similar to the case reported here the diffusible calcium will be increased when the mechanism for producing the tetany lowers primarily the calcium ion concentration in the diffusible portion. The increase in the diffusible calcium means there is a compensatory attempt of the body to produce by mass action more calcium in the diffusible portion in an effort to increase the calcium ion concentration to normal, thus preventing neuromuscular irritability.

SUMMARY

Two cases of spasmophilia of the new born infant are reported, with an extremely high diffusible calcium and an apparently low concentration of ionizable calcium in the blood serum of one infant that was completely studied. Introduction of more calcium ions reduced the diffusible calcium concentration, increased the total calcium concentration and resulted as far as can be determined in the infants' making a complete recovery of their neuromuscular irritability.

Attention is called to the possible difference in the production of this type of spasmophilia occurring in these new born infants who had symptoms similar to classical tetany and to that producing tetany in older infants.

It is believed that there is a substance present in the blood serum of the mother and infant preventing ionization of the diffusible calcium in these cases and this substance is produced in the placenta.

Diffusible calcium values must not be interpreted as meaning the total physiologically available calcium for the control of neuromuscular irritability.

A working hypothesis to explain the mechanism for the production of tetany in all cases is offered.

It is suggested that spasmophilia in the newborn infant associated with an increased diffusible calcium be termed tetany calcipexicus of the new born infant, indicating a binding or making fast of the diffusible calcium ions. This term will serve to differentiate this type of tetany reported here from the tetany of older

infants, tetany due to hyperventilation, and tetany parathyroipriva.

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GENERAL REMARKS ON RAILROAD SURGERY*

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The railroad surgeon has always been one of the best assets of the railroads of the country, but, with few exceptions, the fact was, up to a comparatively recent time, not recognized. Now nearly all of the principal roads look upon the surgical departments as indispensable.

Organization has had most to do with this radical change, and the man chiefly responsible was one of the greatest medical organizers of the world, Dr. D. Z. Dunott, of Baltimore, Maryland. He had the vision, and recognized first the chaotic condition of the railroads of the country in medical and surgical affairs. When the Government during the War took over the roads he saw a wonderful opportunity of organizing and standardizing their medical and surgical departments. He was fortunately in close touch with one of the officials of the railroad administration and was in September, 1918, made chairman of a committee on health and medical relief.

With the aid of the regional directors, a complete survey was made of the medical and surgical affairs of the roads, and a comprehensive report was rendered in 1920, giving an outline of this survey, the results of a wide study, and valuable recommendations regarding betterment of conditions. The report, under the title, "Survey and Recommendations of the Committee on Health and Medical Relief," covered a wide field, including sanitation, preventive medicine and care of the injured.

This splendid and comprehensive work was in its infancy when the roads were returned to their owners. In order to have it continue with as little interruption as possible, Dr. Dunott, aided by several surgeons who were close to him, decided to take the matter up with the Chief Surgeons' Association, with the view of asking the American Railway Association to form a medical and surgical section.

This was done and the section organized in December, 1920. With Dr. Dunott as its chairman for two years, an enormous amount of constructive work was done for the railroads and the public, including the making of a standard sanitary code for all of the states, standardizing of railroad hospitals under the American College of Surgeons and various other improvements in railroad medicine and surgery.

The section has continued actively at work and has put the railroad surgeon on the map.

The untimely death of Dr. Dunott was a great loss to railroad surgery and to traumatic surgery the world over.

The address of President Powell, of the Seaboard Air Line, before this Association in Miami, and that of Vice-President Massey, of the Pennsylvania Railroad, at the meeting of the American College of Surgeons in Chicago, showed that the railroad executives now look upon the railroad surgeon as one of their most important assets.

He is furnishing modern handling for accident cases, high-class hospital facilities for the seriously injured, looking after the sanitation of equipment, roadways and terminals, systematizing first aid work, examining and re-examining employes and also exercising a splendid influence upon the attitude of the public towards the roads. With few exceptions his good work is being fully appreciated.

*Read in Section on Railway Surgery, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

The radical change in attitude on the part of the management of the roads brings with it a heavy responsibility for the surgeon who must bestir himself to still greater efforts and more perfect results.

In these times of trouble the railroad surgeon can do much to aid the public relations departments of the roads in educating the public as to their vital necessity to the entire country and to each community. Practically no town develops without railroad facilities.

The roads, too, are giving magnificent service, and yet largely through thoughtlessness the public is treating them outrageously and handicapping them severely.

The railroad surgeon is usually an influential man in his community. He can do much to educate the public to the advantage, safety and economy of railroad service, and to induce it to demand of legislators, state and national, that unreasonable competition be curbed. Just at this critical time there is nothing more vitally important for the railroad surgeon to do.

In a professional way, however, we can still improve our work greatly to the betterment of our patients and the financial good of the roads. The local surgeon is usually a general practitioner. Fortunately, the surgical departments are mainly so well organized that in major cases he has only to give first aid treatment. But this is most important and greatly assists in the success of the succeeding hospital care. Later in this discussion I shall say a word about surgical cleanliness in general, its neglect and great importance.

For the local surgeon, chemical antisepsis is a necessity, and if properly and promptly employed it will frequently prevent the loss or crippling of fingers and other parts, as well as loss of time.

Mercurochrome is undoubtedly a great aid in the treatment of wounds since it is practically painless. Iodine is better, but at times very painful. The alcoholic solution of mercurochrome is more effective and penetrating than the watery solutions. It is frequently necessary to anesthetize the injured area by hypodermics of novocaine to enable one thoroughly to clean out the wound with bichloride, iodine or mercurochrome to make it practically germ free.

When small wounds are sutured it is practically always best to use rubber dam drains.

Dichloramine T is still most useful, especially in the cleansing of parts which are much soiled. One dressing of this will often make such a wound and the surrounding skin quite clean.

In the first aid care of major cases, stopping of hemorrhages, treating of shock, use of chemical antiseptics and proper immobilization of fractures are all of great importance. While all railroad wounds are infected, the free and proper use of chemical antiseptics will usually give a clean healing.

Dakin's solution made strictly according to Carrel's directions, checked in the laboratory and not made with tablets, is a great aid in extensive wounds. The same wonderful remedy which saved many wounded men in France can still save valuable cases in civilian practice and lessen resulting deformities.

Unfortunately, surgical cleanliness is today much neglected. The present day surgeon must remember that before the days of Lister hospitals were, all of them, nests of infection, and he must further realize that they are still dangerous places for surgical cases unless they are kept scrupulously clean and antisepsis is practiced in the most thorough manner.

The only way to secure real surgical cleanliness is by the strictest personal attention to details.

Many important procedures are now left to the nurses, who only too frequently follow the careless surgeon, thinking that the careful surgeon is over-particular. Strict operating room control is a necessity in every hospital, with a zealous and diplomatic surgeon in charge of all details. Infecting the clean wounds is nothing short of surgical crime!

In large institutions it is practically impossible to obtain clean results in operating rooms where both clean and dirty wounds are handled.

Why were Lane's plates, a wonderful aid in bone surgery, given up by the majority of surgeons? The plates themselves could not cause infection. The trouble is that while soft parts will often take care of a little infection, bones will not.

Why did Murphy advocate the instrumental handling of wounds in bone operations? In so doing he admitted that something in connection with the details of handling bones was not clean.

With a clean operating room, in which dirty cases are not treated, if strict cleanliness is secured in every detail, especially by keeping skin completely covered during the operation, metal plates can be used with impunity. Of course, there are many details that go toward a perfect result in these cases, such as suturing the wound

in such a way as to allow drainage between the sutures and applying a heavy compressing dressing.

Such a technic is also important in hernia operations, to obliterate free spaces, which later can cause much trouble.

It is a great pity and a great mistake that many prominent and influential men advise against the use of chemical antiseptics, claiming that they do harm to the tissues. In railroad surgery they are an absolute necessity.

This giving up of chemical antiseptics resulted in great loss of life in the early days of the World War, and also was the cause of the splendid efforts of Carrel and Dakin who, recognizing a strong antiseptic was needed that could be used continuously in badly infected wounds, without damage to the patient, developed the life-saving Dakin's solution.

Both the local surgeon, in his first aid treatment and in his handling of small wounds, and the hospital surgeon must pay more attention to surgical cleanliness and the free use of antiseptics that destroy germs.

In order to have a clean hospital it is necessary in operating rooms to catch and immediately destroy, by chemicals or heat, every drop of pus that escapes, and in the wards to keep septic wounds well covered, cleansed regularly with antiseptics, and the dressings carefully removed and destroyed. Nurses and physicians should also keep their hands out of infected material, using instruments and gloves to protect them.

In the department of bone injuries the highly developed x-ray technic is recognizing many slight fractures of the spine that formerly caused much back trouble.

When permitted by the railway management, sanitation of stations and equipment, as well as handling of foodstuffs and water on cars, should be under the supervision of a surgical department.

Many roads are now following the example of the U. S. R. R. administration and giving foreign transportation to local surgeons to enable them to attend medical and surgical meetings and clinics. Local surgeons should take advantage of this privilege more largely, for their own benefit and to improve their work for the roads. Those close to the management of the roads would do well to let it be known that the arrangement is a great benefit to them financially.

Railroad surgery is now a splendid field for effective work. With so many handicaps removed, the surgeon can now do much to save life and limb and thereby greatly to lessen the expense of the accident departments.

DISCUSSION (*Abstract*)

Dr. Samuel R. Benedict, Birmingham, Ala.—Dr. Leigh has talked rather at length in regard to the virtues of mercurochrome. I personally have been very much disappointed in its use, and in the last two or three years have used it practically not at all. I still feel that our old friend iodine tincture, 3.5 per cent, is perhaps the safest. Many antiseptics have been brought before the medical profession since iodine first came into its own, but all of them have gradually been put aside while iodine, in my opinion, has maintained its precedence, and it certainly has been proven beyond peradventure of a doubt that it does what it is purported to do, kills bacteria.

Dr. J. F. Abel, Waynesville, N. C.—I think because of the numerous new handicaps confronting the railroad that we railroad surgeons should become practically interested in the road itself. We are all familiar with the great number of wide and heavily loaded busses on our public highways, and I am told that they do not pay a just proportion of road construction and maintenance. They are competing with the railroad which has constructed its ways at great cost and pays a heavy annual tax thereon. I think we should insist through our representative that all public carriers share a just proportion of the cost of ways.

THE MISSISSIPPI PLAN OF MORBIDITY REPORTING*

By H. C. Ricks, M.D.,†
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In presenting the Mississippi plan of morbidity reporting, we do not presume that this plan is the best plan that may be adopted for collecting morbidity reports. We present it as a plan that we believe effective, workable, and adaptable to a state having limited funds to be allotted to the program of collecting morbidity reports.

In Mississippi, every county has a health officer who gives either his full time or part of his time to health work, depending on the plan of organization for promoting health work provided for by the board of supervisors of the county. The organic law of the State since March 1, 1878, has required that each county

*Read in Section on Public Health, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

†State Epidemiologist and Director of County Health Work, Mississippi State Board of Health.

have a health officer and that the health officer be a reputable physician. The responsibility of appointing county health officers was made a part of the duties of the State Board of Health by legislative enactment in the spring of 1880, since which time the county health officers have been responsible to the State Board of Health.

The Legislature of 1904 passed laws requiring the State Board of Health to pass regulations governing the conduct of county health officers and to require of county health officers, municipal health officers, physicians, managers, or keepers of schools, prisons, public institutions, or buildings or places of public resort, such sanitary information relating to diseases and deaths as may be useful; to collect and preserve such information relating to diseases and deaths as may be useful in the discharge of its duties and advise the State and all local governments in all hygienic matters.

The Legislature of 1912 passed laws requiring that the State Board of Health formulate and promulgate rules and regulations for the proper reporting and registration of morbidity and vital statistics prescribing the method and form of making such registration.

In compliance with the laws of 1904 and 1912, the State Board of Health, on recommendation of its executive committee, of which Dr. W. S. Leathers was a member, on October 30, 1913, passed rules and regulations requiring that morbidity reports be collected by each county health officer for the respective counties and that the county health officer report to the State Board of Health on or before the tenth of each month all cases reported to him for the month preceding.

The basic plan for morbidity reporting in Mississippi has remained the same since October, 1913. Certain changes have been made by executive order from time to time.

This brief history is given to show how the plan has been developed and around whom the responsibility of executing the plan has been built, namely, the county health officer.

This card was adopted by the Mississippi State Board of Health October 30, 1913. Each physician in the State is furnished with a supply of these cards and is required to report to the county health officer any cases or suspected cases of any of the diseases named on the card with tularemia and Asiatic cholera added, within twenty-four hours after seeing the case or suspected case. Each county health officer is required to keep a copy of each card received.

Exhibit "A"

CLINICAL REPORT CARD

County ..... File No. ..... (For office use only)

Name of patient ..... Street and No. or R.F.D. .....

Name of householder ..... Address ....., Miss.

Sex ..... Age ..... (In years only) Color .....

Name of disease, or suspected disease ..... (Do not hold report for verified diagnosis)

Date of onset of disease ..... Date of first visit .....

Signature ....., M.D.

Address ....., Miss.

This advance clinical report is not a substitute for the usual numerical morbidity report mailed each month to the Assistant Collaborating Epidemiologist. The physician is required to keep in his possession copies of this report card and mail clinical report of diseases named on reverse side within twenty-four hours after discovery.

Exhibit "B"

WEEK-END SUMMARY OF CLINICAL REPORT CARDS

....., Miss., ..., 19.....

The week-end Summary of Clinical Report Cards ended ..... is as follows:

Diphtheria	.....
Meningococcus meningitis	.....
Acute poliomyelitis	.....
Smallpox	.....
Typhoid fever	.....
Scarlet fever	.....
Tuberculosis (pulmonary)	.....
Undulant fever	.....

....., M.D.
Asst. Collaborating Epidemiologist.

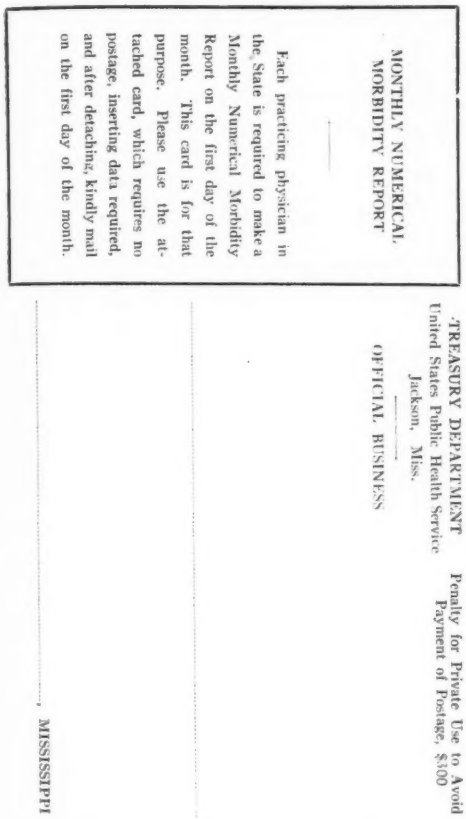
Each county health officer is required to mail this card to the State Board of Health each Saturday, together with any clinical report cards he has received during the week. These cards form a basis for the weekly telegraphic report to the United States Public Health Service.

Each practicing physician in the State is required to mail this card to the health officer of his county on the first day of each month showing whether or not he has seen any cases of the diseases enumerated on the card. A clinical report card is required for all cases of the diseases indicated by an "x."

Each county health officer is required to make this report to the State Board of Health and include all monthly numerical morbidity report cards from the individual physicians of his county. The health officer is required to mail this report so as to have it reach the office of the State Board of Health not later than the 10th of each month. These reports are checked

Exhibit "C"

MONTHLY NUMERICAL MORBIDITY REPORT CARD


MONTHLY NUMERICAL MORBIDITY REPORT
Each practicing physician in the State is required to make a Monthly Numerical Morbidity Report on the first day of the month. This card is for that purpose. Please use the attached card, which requires no postage, inserting data required, and after detaching, kindly mail on the first day of the month.
TREASURY DEPARTMENT
United States Public Health Service
Jackson, Miss.
OFFICIAL BUSINESS
Penalty for Private Use to Avoid Payment of Postage, $300
, MISSISSIPPI

MONTHLY NUMERICAL MORBIDITY REPORT

Of ..... , M.D.

..... Miss., ... County,

for month of ..... , 19.....

Name of Disease	Total	White	Black
xTyphoid fever			
Influenza			
xSmallpox			
xDiphtheria			
xScarlet fever			
xBubonic plague			
xYellow fever			
xMeningococcus meningitis			
xAcute poliomyelitis			
Dengue			
Malaria			
Whooping cough			
Amebic dysentery			
Bacillary dysentery			
Measles			
xLeprosy			
Chicken pox			
Pellagra			
xTuberculosis (pulmonary)			
xOther forms tuberculosis			
Syphilis			
Cancer			
xOther forms meningitis			
Hookworm disease			
Trachoma			
Mumps			
Ophthalmia neonatorum			
Puerperal septicemia			
Gonorrhea			
Anthrax			
xRabies in man			
Rabies in animals			
xUndulant fever			

by the Division of Communicable Disease Control of the State Board of Health. Any physicians reported delinquent are communicated with by return mail, and in most instances their cards are obtained. The monthly morbidity report cards and consolidated reports from each county are checked against the clinical report cards received from the county health officer weekly, and where discrepancies are found, efforts are made to correct them. In counties having part-time health service, the individual physician is communicated with when more cases of a disease are reported than the clinical report cards received indicate. In counties having full-time health service, the health officer is required to obtain these cards or to have the physician correct his report.

In an analysis made by the United States Public Health Service in 1930, Mississippi was given a rating of above the standard for entrance into the proposed Morbidity Registration Area. From 1914 to 1931, inclusive, the average per cent of physicians reporting each month from the State as a whole was as follows:

PER CENT OF PHYSICIANS REPORTING IN MISSISSIPPI

1914	79.0	1923	96.1
1915	90.5	1924	96.3
1916	88.4	1925	95.9
1917	88.3	1926	96.4
1918	93.4	1927	96.5
1919	92.0	1928	97.0
1920	94.4	1929	98.4
1921	96.2	1930	99.27
1922	96.4	1931	99.1

As an indication of how well the medical profession cooperates in the collection of morbidity reports, the physicians of forty-six of the eighty-two counties reported 100 per cent for the en-

Exhibit "D"

THE CONSOLIDATED REPORT OF THE MONTHLY NUMERICAL MORBIDITY REPORT CARDS RECEIVED FROM PHYSICIANS

STATE OF MISSISSIPPI

STATE BOARD OF HEALTH

MONTHLY NUMERICAL MORBIDITY REPORT

Report for _____ County for the month of _____, 19____

NUMBER OF CASES REPORTED BY PHYSICIANS

Name of Disease	Total	White	Black
Typhoid fever			
Influenza			
Smallpox			
Diphtheria			
Scarlet fever			
Bubonic plague			
Yellow fever			
Meningococcus menigitis			
Acute poliomyelitis			
Dengue			
Malaria			
Whooping cough			
Amebic dysentery			
Bacillary dysentery			
Measles			
Leprosy			
Chicken pox			
Pellagra			
Tuberculosis (pulmonary)			
Other forms tuberculosis			
Syphilis			
Cancer			
Other forms meningitis			
Hookworm disease			
Trachoma			
Mumps			
Ophthalmia neonatorum			
Puerperal septicemia			
Gonorrhea			
Anthrax			
Rabies in man			
Rabies in animals			
Undulant fever			

Number of active physicians in county _____

Number failing to report _____

Give name and address of any illegal practitioner _____

Give name and address of any physician who has moved into the county during the month _____

Give name and future address of any physician who moved out of the county during the month _____

Give name, address, age, color, whether active or inactive, and cause of death of any physician who has died in your county during the month _____

Names and Addresses of Physicians Failing to Report:

Dr. _____ P. O. _____

Dr. _____ P. O. _____

Dr. _____ P. O. _____

Dr. _____ P. O. _____

Signed _____

County Health Officer.

Date _____, 19____

(Mail this report to Bureau of Communicable Diseases, State Board of Health, Jackson, Miss.)

tire year of 1931. The reporting by physicians is as efficient in the counties having part-time health service as in those counties having full-time health service.

Of the total number of cases reported for the following diseases, the per cent reported by name was as follows for the respective diseases during 1931:

Diseases	Per Cent Reported by Cards
Diphtheria	87.6
Smallpox	82.9
Typhoid fever	85.6
Scarlet fever	92.2
Meningococcus meningitis	94.5

The budget for the operation of this plan of morbidity reporting for 1932 is $9,480.

The personnel consists of: a director who is also state epidemiologist, one secretary, and one clerk-typist.

VON RECKLINGHAUSEN'S DISEASE WITH UNUSUAL DISTRIBUTION OF NEOPLASTIC NODULES*

By JOHN A. LANFORD, M.D.,
and
E. PERRY THOMAS, M.D.,
New Orleans, La.

While carrying on our routine duties the thought that there is nothing new under the sun does not bother us, but as soon as we see something strange to us, we conclude that the old adage is wrong. That was our impression when we first saw this case of von Recklinghausen's disease, as neither our experience nor reading had presented a similar one. However, when looking up the literature we were soon convinced that we did not have a new condition nor one extremely rare, and that either our reading was not very extensive or our memory was very faulty. We, therefore, apologize to those of the audience who are familiar with a case such as is now presented and beg them to add their experience to the ensuing discussion.

Von Recklinghausen's disease is usually characterized by innumerable neoplasms situated under the skin and arising from the connective tissue of the nerve fibers. Since the origin may be free from the cells of the sheath of Schwann,

*Clinic Case, Section on Pathology, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

*From the Departments of Pathology, Touro Infirmary and Tulane University of Louisiana.

neurilema, or endoneurium, the histology is very varied. Similar neoplasms may arise from all the deeper nerve trunks, somatic and cerebral. The unusual feature of this case is that there are present nodules both under, and in, the skin, along the deeper nerve trunks of the extremities, in the abdominal and pleural cavities and apparently in the spinal canal.

CASE REPORT

The patient, Mr. E. G., 24 years old, was admitted to Touro Infirmary on the morning of September 4, 1932, with the chief complaint of "weakness, difficulty in walking, and subcutaneous nodules all over the body."

His present illness began at the age of 14 when, in the spring of 1921, during convalescence from a severe attack of influenza, he noticed that his legs were painful to the touch, and several months later small, hard, firm nodules began to appear over his arms and legs. These at first were exquisitely tender to touch and to pressure, and caused him severe aching pain which was more intense at night. The nodules became slowly but progressively larger in size and as time passed appeared in other regions of his body. In 1925, he was forced to cease work because of exquisite pain over his lower extremities associated with foot drop. No improvement followed various types of therapeutic measures, the nodules increasing in size, number and distribution. During the last six months his legs have become so weak that he encounters great difficulty in climbing stairs and upon several occasions has fallen down. He has also noticed that his feet and ankles, especially upon the left side, swell, becoming more marked upon standing, and, in addition have felt hot and painful. The nodules over his body have never become acutely inflamed or ulcerated and none has ever disappeared. He has had no parethesia or other sensory disturbance aside from pain and tenderness to pressure. He has noticed that the muscles in his legs sometimes cramp and spontaneously contract; aside from these and the foot drop, there have been no motor disturbances.

During the last ten years he has been able to do only light work because of his general weakness and especially because of the instability of his legs.

During the course of his present illness the patient has tried numerous internal medications and has received intravenous injections, which, he believes, relieved him of the night pains, which previously annoyed him considerably.

During his present illness there have been no visual disturbances and no headaches. His appetite has been poor, but there have been no complaints of nausea, vomiting, or epigastric discomfort, and he has lost no weight. There has been no dyspnea, cough, or pain in the chest. During the past year he has suffered from difficulty in starting to urinate and upon numerous occasions catheterization has been necessary. At the present time he urinates by pushing down upon the lower abdomen with his hands.

Past History.—During childhood he had whooping cough and, at the age of 20, suffered from measles. He denies having ever had a penile lesion. Ten years ago red "whelps" appeared upon his arms, but they were only of a few days' duration.

Family History.—His mother and father are both living and in good health, being aged, respectively, 40 and 43 years. He has one sister and one brother, whose ages are 17 and 22, respectively, both of whom are in good health. His brother has one nodule upon his arm which is similar in all respects to those present over the patient's body. No positive history of subcutaneous nodules or pigmentation of the skin can be obtained in other members of his family.

Physical Examination.—September 4, 1932, the patient is a thin, white male resting comfortably in bed. The temperature, respiration and pulse rate are normal. The radial artery reveals no evidence of sclerosis.

Numerous nodules of firm consistency and of varying sizes are present over the patient's entire body. Some are subcutaneous, while others, more deeply situated, appear to follow the nerve trunks. These latter are tender to the touch and pressure upon them causes pain in the areas of peripheral nerve distribution. The nodules are smooth in outline and, for the most part, freely movable, although those in the neck are limited in motion, apparently due to attachment to underlying structures. The largest nodules are present in the supraclavicular spaces, the axillary fossae, and over the arms and thighs generally. Tumor masses are also noticed in the skin over the forehead, scalp, abdomen and chest. A few small nodules are present along the course of the intercostal nerves and palpation reveals a large irregular mass in the left lower quadrant of the abdomen and a smaller mass in the right lower quadrant. No masses are present on the hands and feet.

Numerous irregular areas of pigmentation are noted over the arms, forearms and both legs.

The patient has a peculiar unsteady gait with a toe-drop upon both sides. Romberg's sign is negative. The triceps and biceps reflexes cannot be elicited. The patellar reflexes are absent. Anesthesia to light touch is demonstrated on the left leg as far as the knee and over the plantar surface and dorsum of the right foot. Deep touch is perceptible. No pain or tenderness to pressure is present. There is an inability to dorsiflex the left foot. Movements at the knee and hip joints are normal. The feet, ankles and legs are edematous, and this is more marked upon the left side. Pitting upon pressure is obtained over these areas.

A loss of vibratory sensation is present over the whole of both lower extremities. A loss of proprioceptive sensation is also detected. Sensation to heat and cold is absent below the twelfth dorsal segment.

On September 8, 1932, x-ray plates were taken of his chest from an antero-posterior and lateral views. Dr. W. F. Henderson, the roentgenologist, reported that:

"Both costophrenic angles are showing a small amount of pleural thickening, which, however, is a part of the pleural thickening along each side and does not seem to involve the diaphragm itself. The diaphragms are otherwise normal. The heart and aorta are believed to be normal. The chest, however, other than these structures, is showing decided evidences of alteration.

"First, there are observed two fairly large masses in the mediastinum which seem to extend out into the left pulmonary field. Of much more interest is a fairly large number of rounded tumor-like shadows which exist from apex to base. Two fairly large bilaterally symmetrical tumors exist in the apices and a chain of

these shadows extend down the axillary margin of the thoracic wall. Stereoscopically, the impression is gained that the tumors along the lateral chest wall are either of the pleura itself or that they lie just outside the pleura and are bulging this into the thorax. The tumors in the apex, however, seem actually occupying space which should be occupied by pulmonary tissue. It is also observed that some destructive processes are occurring at scattered locations about the ribs.

"This department finds itself unable to state positively the nature of the tumors in this chest. However, the fact that these tumors are bilaterally symmetrical, that no fluid is present, that the pulmonary fields are themselves otherwise normal, and that no deviation of the trachea has occurred, would seem to rule out inflammatory processes, metastatic neoplastic disease, and traumatic lesions."

On September 8, 1932, a biopsy was performed; one of the nodules upon the thigh was removed by Dr. I. W. Kaplan. This tissue was reported by the pathologist as a neurofibroma showing considerable edema.

On September 13, 1932, the neurologist, Dr. Gilbert Anderson, in consultation, reported:

"The legs are in general weak and slow. There is a paralysis of the dorsiflexion of the feet and weakness in extension of the legs. The patient cannot extend his toes. Flexion is fairly strong. No tendon reflexes can be elicited in the legs, but they are present and normal in the arms. No abdominal reflexes can be elicited. Sensation is impaired up to the level of Poupart's ligament which corresponds to the twelfth dorsal segment; deep sensation is also lost. There is probable involvement of the cord through pressure of a tumor mass upon the nerve roots apparently extradural in location. This may be multiple, but is now manifested chiefly as stated above."

On September 26, 1932, a barium enema was administered in an effort to determine the exact localization of the two masses which were palpated in the abdominal cavity. Dr. W. F. Henderson, the roentgenologist, reported:

"The administration of a barium enema shows the cecum and ascending colon as well as the hepatic flexure grouped in a small mass as though crowded into this space by extrinsic conditions. The transverse colon and the upper part of the descending colon are normal, but from the upper margin of the left iliac crest the colon takes a most unusual course in that it passes again upwards and transversely across the body to reach the right side of the spine from which point it descends in almost a straight line to the rectum. This last segment, including the sigmoid and rectum, is so spasmodic that it casts its shadow only occasionally as barium passes through it. During the interval it empties itself completely of barium so that at radiography no shadow is obtained. Fluoroscopically, it is observed to dilate sufficiently to allow barium to pass through. The unusual displacement of the colon can be accounted for by masses within the abdomen and the marked irritability may also be associated with this. There is likewise a marked filling defect in the region of the hepatic flexure, but its exact nature cannot be determined because of the unusual grouping of the loops of bowel in this region."

On October 13, 1932, a consultation was requested with the ophthalmologist, Dr. Henry Blum, who reported the eye grounds normal.

Laboratory Examinations.—Urinalysis, on several occasions, showed a faint trace of sugar and acetone, but otherwise was negative.

A complete blood picture revealed a hemoglobin of 55 per cent with no other abnormalities. The Wassermann was negative.

Lumbar Puncture:
Pressure 8 mm. of mercury
Queckenstedt negative
Cells 6-7
Globulin strongly positive
Wassermann negative in 1 c. c.
Colloidal gold 1123432100

During his stay in the hospital his condition remained unchanged. No therapeutic regime was instituted.

We have here presented a case of von Recklinghausen's disease showing widely distributed nodules involving the skin, nerve trunks of extremities, intercostal nerves, abdominal nerve trunks, and the nerve roots in the spinal canal.

Associated with these neoplasms are widely distributed areas of pigmentation. Since one brother shows a similar type of nodule on his arm, the hereditary tendency is borne out.

IMPORTANCE AND LIMITATION OF THE TEACHING OF MEDICOLEGAL PATHOLOGY IN THE UNITED STATES*

By HARVEY S. THATCHER, M.D.,
Little Rock, Ark.

The teaching of medicolegal pathology in this country is generally known to be seriously neglected. Our medicolegal system is primitive, and it is for this reason that there is not first class instruction in forensic medicine.

As life becomes more complex there is greater necessity for the proper handling of these problems. The sudden deaths from the automobile are striking examples. The enactment of a law in Baltimore for a coroner to investigate automobile accidents illustrates the need for more trained men. Industrial diseases represent another great field. The cost of crime, amounting to hundreds of millions of dollars (as described by the Wickersham commission in its study of law observance and enforcement) proves the tremendous importance of this subject.

The fact that the teaching of medicolegal pathology is of a low standard is not due to the teachers of pathology, but to defective coroner

*Read in Section on Medical Education, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

*From the Department of Pathology, University of Arkansas School of Medicine

laws, which prevail in the majority of our states. We are using a system probably instituted by Henry I (1100-1181), although it was first referred to in Articles of Eyre (1194). At that time and later it was an office of great dignity, because it was for the purpose of protecting the crown. The origin of the word from corona, meant crown. It was an elective office then, but only knights were eligible.

England has developed to a slight degree in regard to this law, while we still cling to more of the ideas of mediaeval life. In 1926, the Coroners' Amendment Act was passed in Great Britain, which requires that the coroner shall be a barrister, solicitor legally qualified medical practitioner of not less than five years' standing in his profession, with tenure of office permanent. Even with these changes the system is extremely inadequate compared to the advanced continental systems.

Last year I visited the new medical college in Lyons, France, where the most modern ideas of the medical world are adopted. The Institute of Legal Medicine is associated with this medical center so that students may have proper instruction in medicolegal pathology. This Institute is remarkably equipped with a museum of judiciary medicine and museum of criminal anthropology. The medicolegal institute of Paris is considered part of the School of Medicine of the University of Paris, as it is under the direction of the Professor of Legal Medicine. Other European countries have similar highly efficient systems.

The Canadian coroner laws are about as ineffective as those in the States.

The pernicious method prevailing in the States is the coroner elective system. Mechanics, shopkeepers, undertakers and other untrained individuals are holding these offices. (A business advantage may be considered by the undertaker-coroner.) If the coroner is a physician, he is usually mediocre and unqualified for the pathological or the legal phase of the position. No person could be an expert in all of the sciences required to give adequate reports on causes of death even when the legal knowledge was not considered. When he chooses his assistants it is natural for him to select political friends.

The effect of this kind of protection has undoubtedly caused many scandals, most of which have been hushed so that the public has little or no knowledge of them. In a limited experience, I have some information in regard to several of the defects with the following facts: (1) a coroner in one of our Northern cities was offered a bribe of $10,000.00 to make certain changes in a death certificate; (2) a suicidal death was considered an accident because the coroner was a friend to the family of the deceased, and a suicidal clause was in the insurance policy; (3) coroners are able by means of the fee system to collect extravagant sums of money; (4) bodies are buried without autopsy when the cause of death is questionable, and death certificates are signed haphazardly; (5) coroners will turn cases over to certain undertakers. If some of these irregularities are brought out in my brief experience, there must without doubt be innumerable serious errors occurring in most localities.

Cleveland, Ohio, has been making some advances, but there was plenty of room for this progress. In 1919 the following reports from autopsy records of Cuyahoga County illustrate some of the irregularities:

No.
22942—Could be suicide or murder.
22957—Auto accident or assault.
22990—Head severed from body.
23035—Found dead in alley, lobar pneumonia.
23512—Could be diabetes or poison.
23241—Suspicious of strychnine poisoning.
23050—Premature or abortion.
23551—Died suddenly after taking medicine.
23178—Aunt said she complained of pneumonia; looked like narcotism.
23187—Diabetes, tuberculosis or nervous indigestion.

The system in Chicago has been in harmony with all of its graft and inefficiency. New Orleans certainly has been a city that has failed to appreciate the importance of the position. A medical man is its coroner, however inefficient he may be. Richmond, Virginia, has had ignorant and inefficient coroners, as have the majority of our cities.

In Arkansas there is a statute which requires a coroner's inquest. This coroner is a peace officer who executes the duties of a sheriff should the sheriff be disqualified or incapacitated. He can also make arrests. An excellent chance is open for crookedness, and I doubt that this opportunity has always been overlooked. A brief summary of the defects in Arkansas will apply to almost all of our states. Lack of high class physicians in the office, lack of knowledge to analyze evidence of witnesses or assist jurors, and a defective coroner's jury are some of the outstanding evils. A coroner's jury is usually a joke when we begin to look into all of the facts.

However, the United States coroners' system has developed in a few localities. The State of

Massachusetts established the Medical Examiner System in 1877. Medical examiners in that State are appointed for a period of seven years on a definite salary. After more than fifty years of trial there have been few faults. Similar methods have been established in other New England states.

I am more familiar with the system prevailing in New York City under the capable leadership of Dr. Charles Norris. The Medical Examiners Act became effective there January 1, 1918, after about twenty-four years of agitation. In 1915 the Commission of Account had investigated this situation and concluded that the coroner's system as then conducted could not be continued except as a public scandal and disgrace. The Medical Examiners Act required the appointment of a chief medical examiner with competent medical assistants to take charge of medical investigations of sudden, violent and suspicious deaths. The detective investigations were conducted by police and district attorney. The quasi-judicial functions were given to magistrates' courts and to grand juries. The causes of death are in the hands of scientific medical men in New York City. It is remarkable that Dr. Norris has been able to maintain high standards, although his budget has been greatly limited. He has cooperated with the City Health Department, hospitals and teaching institutions. He has kept the spirit of research alive even when the days were crowded with routine.

Thus we try to teach medicolegal pathology without proper teaching material. The instruction is mainly didactic because of this lack of special autopsies. Sometimes we find an honest but ignorant coroner who will cooperate with teaching institutions. A shift in politics will change the entire situation.

It hardly seems possible that with our civilization such laws continue to exist. The problem naturally interests both legal and medical professions. A medical examiners' act such as that established in Massachusetts or in New York City should exist in every state. Medicolegal institutes should exist similar to those in Europe with affiliations for teaching. Adequate teaching of medicolegal pathology should be encouraged and specialization in this subject maintained.

The argument that a repeal of the coroner law is practically impossible is not true. New Jersey in 1927 adopted the medical examiner system. Political influences can be weakened when evils are brought to light, although it is a difficult process.

The teaching of forensic medicine involves considerable cost, since it includes other sciences as toxicology, bacteriology, serology and psychiatry. This means expensive equipment and trained men. When we consider the cost of crime, the outlay is of little consequence. The lack of use of this branch of medicine means that numerous criminals are not prosecuted. It means injustice to insurance companies as well as to the individual. It also means a great scientific loss.

My thanks are due A. F. House, attorney, Little Rock, Arkansas, for his advice on the legal phase of this paper. I wish to absolve him, however, from any statements that I have made.

DISCUSSION (*Abstract*)

Dr. Wiley D. Forbus, Durham, N. C.—During the past few months I have been in correspondence with all the state attorney generals and the state public health officials relative to the existing laws of the respective states which govern the performance of autopsies. Through the courtesies of these state officials I have been able to obtain copies of all laws which relate to the duties, responsibilities, *et cetera*, of the coroners and also all the statutory provisions which govern the performance of the autopsy. I had hoped to be prepared to present at this time by way of discussion of Dr. Thatcher's paper a digest of this material, but it has not been possible for me as yet to coordinate it. It is my impression from what I have been able to gather thus far from my data that relatively few of the states have statutory laws governing the postmortem investigation as it is applied to cases for scientific purposes. Many if not all the states provide for the use of unclaimed bodies for dissection purposes (not for autopsy) and of course all have laws governing the duties and responsibilities of the coroners. The latter provisions are often confusing and not infrequently hinder rather than help scientific postmortem investigation.

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M. Y. DABNEY, M.D., Editor
EUGENIA B. DABNEY, M.S., Assistant Editor
C. P. LORANZ, Secretary-Manager

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EDITORIAL DEPARTMENT

N R A The Southern Medical Association, through its Secretary-Manager, signed the President's N R A code and put it in force at the earliest effective date, August 1st. The Southern Medical Journal is produced in a printing plant operating under the N R A code. We do our part.

RICHMOND IN NOVEMBER

PROGRAM OF THE FIRST RICHMOND MEETING

Nineteen years ago the Southern Medical Association met in Richmond. There were five scientific sections: medicine, surgery, ophthalmology and otolaryngology, public health, and railway surgery. The program of the meeting in 1914 contained the names of Harvey W. Wiley, Howard A. Kelly, Stuart McGuire, William S. Thayer, John A. Wyeth, Cary T. Grayson, George Simmons, William Crawford Gorgas, among those of other distinguished Southerners, many of whom will return to the second Richmond meeting next month.

Glancing through the subjects which were discussed at the earlier meeting, one sees a paper upon plague control in New Orleans, symposiums upon hookworm, pellagra, typhoid fever; several papers suggesting the stage of development of radiology at that period, when the x-ray was still a novelty to many; a paper entitled "The Appendix: Has the Last Word Been Said About It?" Only four scientific exhibits are listed: those of the Robert M. Thompson Pellagra Commission, of Tulane University, of Dr. J. Shelton Horsley, and of Dr. J. W. Squires.

PROGRAM FOR THE 1933 RICHMOND MEETING

The program for this year will contain many essays and scientific exhibits illustrating x-ray diagnosis of fractures, diseases of the stomach, liver, intestines, bones and urogenital tract. Each year adds another tissue to those which may be visualized by the x-ray. Emphasis has turned from the treatment of many contagious and infectious diseases to practical methods for their prevention. There has been no let up in experiments upon the treatment of syphilis, and a new plague, encephalitis, comes in for some attention. There has been a great development in understanding of the conditions which are diagnosed by examination of the blood cells (as the anemias and leukemias) and those diagnosed by chemical measurement of blood constituents such as sugar, nitrogen, and calcium. There is progress in knowledge of the clinical effects of hormones and of experimental dietary deficiencies. A speaking acquaintance with several branches of laboratory work is increasingly necessary in every day practice. The technic of surgical operations advances steadily.

This is to mention only a few of the trends which strike one's eye in comparing the program of 1914 with that of the current year. The man whose experience extends over this period has lived and learned a great deal. His means of development have been through the reading of good journals and attendance upon carefully planned medical meetings. The program for November has been worked out by officers of the Southern Medical Association to give a good all round picture of the year's progress. The complete program will be published in the November JOURNAL.

SCHEDULE AND MEETING PLACES IN RICHMOND

The meeting starts on Tuesday, November 14, at 9:45 a. m., with a general clinical session conducted by the physicians of the host city. On Wednesday there will be a general clinical session with presentations by physicians from other parts of the country. Several sections and conjoint meetings (gynecology, ophthalmology and otolaryngology, railway surgery, the allergy clinics and dermatology clinic, the Southern Section of the Society for Experimental Biology and Medicine, and the Southern Branch, American Public Health Association) will assemble concurrently with the general session on Wednesday. Thursday and Friday will be occupied entirely with section meetings.

At the general session on Wednesday evening Dr. Irvin Abell will deliver his presidential ad-

dress; this will be followed by the president's reception and ball. There will be alumni reunion dinners on Thursday evening. There will be the usual golf and trap shooting tournaments and unusually delightful entertainment for the visiting women. This will include a trip to Jamestown, the first permanent English colony in America, and to Williamsburg, whose beautiful and historic buildings are being restored by Rockefeller funds, as well as to many other spots of interest in and about one of the oldest great cities of the South.

The Hotel John Marshall will be general headquarters. The registration, scientific and technical exhibits, the general clinical sessions and several of the sections will convene there. All other scientific sections will assemble near the John Marshall and will be readily accessible to each other. The Jefferson Hotel is headquarters for the four organizations meeting conjointly with the Southern Medical Association and for the Woman's Auxiliary.

A post-meeting day in Washington on Saturday, November 18, has been arranged, the program for which will be informal. Full plans will be reported later.

RAILROADS AND TRANSPORTATION

All railroads have granted reduced fares for the Richmond meeting, the rates to apply to Richmond or to Washington *via* Richmond. The rate will be one and one-third fares for the round trip, going and returning the same way or going one way and returning another, final limit thirty days from the date of sale. The Chesapeake and Ohio Railroad has already announced a President's Special operating from Louisville, the home of Dr. Abell. This special leaves Louisville Monday, November 13, at 1:30 p. m. The Seaboard Air Line Railway has announced special service from points in Georgia, Florida, Alabama, Louisiana, Mississippi and Tennessee, Birmingham and Atlanta being the concentration points.

Excellent roads for motorists lead into Richmond, which has also a modern airport.

Comfortable hotel accommodations are promised those who plan to attend the meeting. Complete information regarding the hotels will be found on page 903.

A complete roster of the officers of the Southern Medical Association, of its sections and organizations meeting conjointly, of the Richmond Academy of Medicine, and the chairmen of committees will be found on page 906.

THE TIME IS SHORT

With a past crowded with events of deep significance in the history of the nation, a present stirred by all the vigor of modern Americanism, and a medical atmosphere placing it among the important clinical and educational centers of the country, Richmond offers not only hospitality but interest and diversion of an unusual degree to physicians from the South who will assemble there next month. The meeting date is practically at hand, and reservations should be made now, for Richmond, November 14-17, 1933.

DIPHTHERIA PREVENTION SIMPLIFIED

To appreciate one's good fortune in the present depression one need only glance through the medical journals of the beginning of the century. In the recent past are to be noted frequent epidemics of typhoid fever, small pox, yellow fever, and other devastating contagious diseases which are now thought of somewhat as mediaeval plagues. Their menace is, of course, by no means eliminated. A few months' abandonment of the customary preventive inoculations and sanitary practices would permit them to become widespread again.

Diphtheria, one of the most dangerous maladies of childhood, has yielded a little more slowly to modern prophylactic measures than have small pox and typhoid fever; it still has a higher incidence rate. This is probably because the technic of preventive inoculation has been more difficult than in the case of the diseases for which a vaccine is available. For typhoid prevention, as is well known, killed cultures of *B. typhosus* are administered. The Klebs-Loeffler bacillus produces an exotoxin, outside the bacterial cell, which is so virulent that filtrates of the organism may not be given to human beings in immunizing doses. Instead, the filtrate of a diphtheria culture, the toxin, is administered to a horse or other animal in several doses. Subsequently immune animal serum, antitoxin, is collected. Three doses of a mixture of toxin and antitoxin in animal serum are then given to human beings and are followed by occasional unpleasant reactions, chiefly from the foreign protein in the serum. These biological products are of course costly.

Twenty-five years ago it was doubted that vaccination against typhoid fever would ever be voluntarily accepted by any large proportion of the population.[1] Propaganda for three prophy-

1. McCrae, Thomas: Treatment of Typhoid Fever. J.A.M.A., 91:983, 1908. Sou. Med. Jour., this issue, p. 900.

lactic injections of diphtheria toxin-antitoxin was obviously less liable to succeed. Nevertheless, in 1918, Dr. W. H. Park, of the Department of Health of New York City, undertook to immunize the entire child population of New York by this method.[2] His efforts met with considerable success and the movement spread through the United States. The incidence of diphtheria has been greatly reduced in the last fifteen years.

Many workers have attempted to develop a simpler product than toxin-antitoxin for diphtheria prophylaxis. As far back as 1899 the immunizing properties of toxoid, that is, toxin which has been treated with formaldehyde to reduce its toxicity, were studied. Several preparations of diphtheria toxoid have recently been given to large groups of school and preschool children. A toxoid developed by Ramon, of the Pasteur Institute in Paris, is now recommended by Park.[3] The antigenic or immunizing value of two soluble toxoids were compared by Park and Schroder[2] with the usual toxin-antitoxin mixture. Guinea pigs which receive two toxoid injections, they say, develop a higher degree of immunity than those which receive three injections of toxin-antitoxin. The results with children were of the same order. In their series of several hundred children, 90 per cent became immune after three injections of toxin-antitoxin; 93.7 per cent after two injections of Ramon's toxoid; and 98.2 per cent after two injections of the toxoid to which a small per cent of alum had been added.

In 1926 Glenny and Barr,[4] of the Wellcome Physiological Research Laboratories, in England, while injecting horses to prepare diphtheria and tetanus antitoxins, noted that a stronger antitoxin was obtained if the horse received toxoid precipitated with a rather large quantity of alum than if a soluble toxoid were given, such as that recently used by Park. Wells, Graham and Havens,[5] of the Department of Public Health of Alabama, in Montgomery, further studied the properties of the insoluble toxoid of Glenny and Barr in children and in animals. Theirs is the first record of the employment of this preparation in prophylactic work by a state health department. One injection, the Alabama workers say, induced a high degree of immunity in guinea pigs and in a group of about 100 children. This is in contrast to the two injections recommended by Park for soluble toxoid. Graham, Murphree and Gill,[6] of Montgomery, subsequently injected 798 children in Alabama with the same preparation. Two to six months after a single injection about 95 per cent of the children were found to be immune by the Schick test. Excellent results have also been reported by the Virginia State Board of Health.[7] According to McCoy,[8] of the National Institute of Health in Washington, the precipitated toxoid seems to be from 20 to 50 times as effective as crude toxoid.

The substitution of a simpler and more concentrated antigen for diphtheria immunization is obviously a great improvement in technic which will effect considerable economy in labor and material in immunizing large groups. Those few individuals who have objected to three inoculations with toxin-antitoxin and its accompanying horse serum will be interested in a method which requires only one "shot."

It is to be recalled to those who are not intimate with the nomenclature of bacteriology that a toxoid acts like a vaccine. It prevents the disease if given before exposure. It has none of the supposed curative properties of an immune serum, and is useless in the presence of infection. For preventive inoculation, the precipitated toxoid is apparently the most desirable product. This work is of particular interest in the fall of the year, when diphtheria has its peak.

2. Park, W. H.; and Schroder, M. C.: Diphtheria Toxin-Antitoxin and Toxoid: A Comparison. Amer. Jour. Public Health, 22:7, 1932.

3. Park, W. H.: Replacement of Toxin-Antitoxin by Toxoid with a Consideration of the Comparative Dosage. Amer. Jour. Public Health, 23:60, June, 1933.

4. Glenny, A. T.; and Barr, M.: Precipitation of Diphtheria Toxoid by Potash Alum. Jour. Path. & Bac., 34:131, 1931.

5. Wells, D. M.; Graham, A. H.; and Havens, Leon C.: Diphtheria Toxoid Precipitated with Alum. Amer. Jour. Public Health. 22:648, 1932.

6. Graham, A. H.; Murphree, L. R.; and Gill, D. G.: Diphtheria Immunization with a Single Injection of Precipitated Toxoid. J.A.M.A., 100:1093, April, 1933.

7. McGinnes and Stebbins: Jour. Med. Ass'n. State Ala., 3:83, Aug., 1933.

8. McCoy, G. W.: Personal communication to Dr. J. Norman Baker, Montgomery, Ala.

9. Curtis, G. M.; Davis, C. B.; and Phillips, F. J.: Significance of the Iodine Content of Human Blood. J.A.M.A., 101: 901, Sept. 16, 1933.

10. Levine, H.; Remington, Roe E.; and von Kolnitz, H.: Studies on the Relation of Diet to Goiter. II. The Iodine Requirement of the Rat. Jour. Nutrition, 6:347, July, 1933.

GLEANINGS FROM RECENT JOURNALS

Cause of Thyroid Enlargement.—Iodine is usually thought of as the element responsible for maintenance of normal thyroid function. Its level in the blood is an index of the activity of the gland.[9] About 60 to 120 gammas of iodine per day (a gamma is one-millionth of a gram) is the amount calculated by Levine, Remington and von Kolnitz,[10] of the South Carolina Food Research Commission, to be necessary for

normal thyroid function in the adult human being. In animals on diets deficient in this small amount there is a gross enlargement of the gland associated with microscopic abnormality.

The pathological picture may be hastened by varying another component of the diet. The addition of a calcium salt[1] (calcium carbonate) to a ration deficient in iodine results in a greater and more rapid increase in the size of the thyroid and in the acinar hyperplasia. Excess calcium, in certain conditions, thus can hasten the development of goiter.

Recently there has been a tendency to prescribe calcium salts freely in certain conditions, as in rickets and in pregnancy. It is possible that clinical goiter may be induced by this means if iodine is not also supplied.

Thyroid and Liver.—Higgins,[2] of the Mayo Clinic, reports on the effect of various diets in stimulating liver regeneration after part of the liver has been removed. He found that normal liver growth and liver regeneration were considerably stimulated by feeding dried thyroid gland.

Iodine in Eggs.—The amount of iodine in hens' eggs, like the amount of vitamin D of cow's milk, varies directly with the quantity of this substance in the ration.[3]

TWENTY-FIVE YEARS AGO

FROM JOURNALS OF 1908

Typhoid Fever.—Dr. Thomas McCrae,[4] of Baltimore, said:

"Many patients will go through an ordinary mild attack with any reasonable kind of food, but I feel that in the attack of ordinary severity and in all severe attacks the simpler the diet the better for the patient. Milk and albumin water are satisfactory, easily obtained and prepared and cheap. We should always be careful to make certain that we are not giving contaminated milk. . . .

"The patients who are not purged seem to do just as well—in fact, better. . . .

"While we are all aware of distention of the intestines, it is not so generally recognized that distention of the stomach is by no means rare. It may give considerable distress and affect both the respiration and the action of the heart. The passage of a stomach-tube gives immediate relief and no hesitation need be felt in doing it. . . . It is well to cut down the diet to albumin water and to repeat the passage of the stomach-tube as often as necessary. . . .

"When we remember the frequency of bacilluria and the very common presence of typhoid bacilli in the gallbladder, it seems wise to suggest the administration of hexamethylenamin (urotropin) to every patient.

"While preventive inoculation has proved of some value in military medicine, especially when troops were to be sent to infected localities, yet the results have not been strikingly successful. That it can be of much value in ordinary practice seems doubtful, especially when we remember that it is not wise to employ it during the time of an epidemic, owing to the temporary increase in susceptibility following the inoculation. The 'man in the street' is not likely to be willing to undergo it at other times. . . ."

Dr. John A. Witherspoon,[5] of Nashville, Tennessee, discussing Dr. McCrae's paper, said:

"I feel much like the boy who wrote the essay on snakes in Ireland and said, 'There are no snakes in Ireland.' There is no treatment of typhoid fever. . . . Sweet milk has been, in my experience, one of the most universal disturbers of stomach and intestines of any nourishment I have seen used in typhoid fever. . . . I believe that Dr. McCrae, who gave us an elegant way of relieving the distended stomach with the stomach-tube, if he feeds his patients properly, will rarely find any necessity for using the stomach-tube."

Dr. R. M. Harbin,[6] of Rome, Georgia, said:

"The rational treatment . . . is a restricted diet, or fasting; . . . gelatin is a valuable adjuvant in the dietary of a typhoid patient. . . . Milk should be absolutely forbidden. . . . The great desideratum is to treat the patient and not the disease."

Panama Canal and Russo-Japanese War.[7]—"The building of the Panama Canal and the sanitary record of the Japanese in their war with Russia are the two great object lessons of recent years, demonstrating that men can neither work

1. Thompson, J.: Influence of the Intake of Calcium on the Thyroid Gland of the Albino Rat. Arch. Path., 16:211, Aug., 1933.
2. Higgins, G. M.: Experimental Pathology of the Liver. Arch. Path., 16:226, Aug., 1933.
3. Wilder, O. H. M.; Bethke, R. M.; and Record, P. R.: The Iodine Content of Hens' Eggs as Affected by the Ration. Jour. Nutrition, 6:407, July, 1933.
4. McCrae, Thomas: The Treatment of Typhoid Fever. J.A.M.A., 51:983, 1908.
5. Discussion, idem, p. 988.
6. Harbin, R. M.: Typhoid Fever: A Summary of 148 Cases with Reference to the Efficacy of Therapeutic Fasting. J.A.M.A., 51:194, 1908.
7. Triumph of Sanitation at Panama. Editorial, J.A.M.A., 51: 764, 1908.

nor fight to the best advantage unless protected from infectious and preventable diseases. . . . All nations will profit by the sanitary lesson of the Panama Canal."

Fourth of July, 1908.[1]—"The supreme contempt of the American public for human life, as exemplified in our appalling daily slaughter by railroads, machinery and preventable diseases is nowhere so vividly shown as in this annual massacre. . . . We can look forward to having the responsibility of the care of some five thousand wounded young patriots laid on the medical profession this year as every year, and we hope to see the steady and remarkable gain in the reduction of tetanus mortality continued. When the *Journal* first began its statistical studies five years ago, the Fourth of July cases [of tetanus] numbered 415."

DR. WILLIAM RAY BATHURST

IN MEMORIAM

With deep regret the Southern Medical Association learns of the death of one of its best known members, Dr. William Ray Bathurst, of Little Rock, Arkansas. Dr. Bathurst served as a member of the Council from 1917 to 1925; as Chairman of the Council in 1925; as President of the Association in 1928, having been elected in 1927; and as a Trustee from 1928 until his death. During his tenure of these several offices he led his professional associates in many policies for the advancement of Southern medicine and medical education.

He was a dermatologist and radiologist of wide reputation, a man of progressive ideals, and of kindliness and generosity, who spent a large part of his waking energy in unremunerated service to his profession. Among many other activities, he was Secretary of the Arkansas State Medical Association and Editor of its journal from 1919 until his death; the large membership in the state society and the solidarity of the physicians of Arkansas testify to his powers of organization. On Wednesday, August 30, he complained of feeling badly and absented himself from his office. On August 31 he was found dead in bed at his home, having succumbed in his sleep to heart disease.

Of vigorous personality, a comparatively young man with years of expectation of health and medical productiveness, his death will be a severe loss to his many friends throughout the South.

1. Fourth of July Accidents. Editorial, J.A.M.A., 51:42, 1908.

Richmond—Where We Meet

INTRODUCTION*

Though the lure of a rich past and the notable dimensions of a vigorous present will charm and impress any visitor to Richmond, the physician of the South will naturally have his keenest interest in the medical atmosphere surrounding the city for the 1933 meeting of our Association.

Here again the many-sided capital of the Old Dominion has much to offer. For nearly a hundred years a medical school has had its home in Richmond, exerting an influence of enormous professional importance that was not even interrupted by the War Between the States, which closed every other institution of its sort in the South. Facing, but overcoming, many difficulties, the Medical College of Virginia has advanced steadily with the times and today, with an enrollment of nearly eight hundred in its various coordinate departments, holds high rank in the field of medical education.

In Richmond have come and gone, and continue to come, able physicians whose outstanding qualifications

*By Dr. Joseph F. Geisinger, Chairman of Sub-Committee on Publicity, General Committee on Arrangements from the Richmond Academy of Medicine, Richmond, Va.

have made their names known to the profession throughout the country. Medical journalism has been fostered here to a notable degree and is represented today by the well-known *Virginia Medical Monthly.* The local profession has a focal point in an Academy of Medicine, which has recently become domiciled in a building regarded as one of the handsomest and best equipped in the country. Within this building has been installed the priceless Miller Library, one of the most important collections of medical books and manuscripts in the world. Scattered about the city are numerous hospitals, public and private, with a total bed capacity of about sixteen hundred patients. The roster of Richmond physicians contains three hundred and forty names.

Such, in briefest form, is the medical center which becomes the host of the Southern Medical Association in November. The picture is more fully drawn in the article which follows and which was prepared for this issue by Dr. Wyndham B. Blanton, of Richmond, whose "Medicine in Virginia in the Seventeenth Century" and "Medicine in Virginia in the Eighteenth Century" have won national recognition and established their author firmly in the first rank of medical historians.

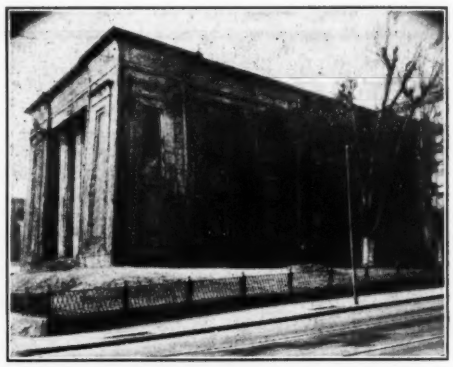
RICHMOND AS A MEDICAL CENTER*

The Southerner visiting in Richmond expects to be shown many historical landmarks. If he be a physician, his interest will naturally center in the medical traditions of the city. He will be interested to know that from the beginning Richmond physicians have assumed positions of civic as well as professional prominence. Dr. William Foushee was the city's first mayor, and since his time three doctors have occupied this high position—John Adams, James McClurg, and J. Fulmer Bright, who is now in office. Foushee and Adams Streets were named after two of these physician-mayors, and bear enduring testimony to the high regard in which they were once held. Several of Richmond's finest antebellum residences were built and dwelt in by physicians—the beautiful Archer house but recently razed erected by Dr. George Watson, the old Virginia Hospital on East Clay Street and the White House of the Confederacy, by Dr. John Brockenborough.

The Egyptian Building at Fourteenth and Marshall, built in 1845, the second home of the Medical College of Virginia, is declared by all competent to judge to be the finest example of Egyptian architecture in this country. Here was established the leading medical center of the State; here taught many able men: Charles Bell Gibson, who introduced anesthesia into Virginia; Jeffries Wyman, who afterwards became Hersey Professor of Anatomy at Harvard University, and Brown-Séquard, the French savant from whom the well-known neurological sign took its name, and here were educated most of the State's future doctors.

Richmond's contribution to the medical history of the Civil War was considerable. Early in the hostilities the city became a hospital center. Nowhere else in the South were so many sick and wounded congregated. General Hospital No. 1, first of the Civil War hospitals organized, was housed in the city almshouse. Here five hundred patients could be accommodated, and the Sisters of Charity did the nursing. The Chimborazo Hospital, located on Chimborazo Hill (Church Hill), a salubrious spot overlooking the present city of Richmond, was constructed very much after the order of the cantonment hospitals in the World War, and was the largest hospital the world had seen up to that time. In the course of the War it cared for 75,000 sick and wounded. Dr. James B. McCaw was in command and, at a time when supplies were scarce everywhere, he managed to meet the needs of his patients for food and clothes by an extensive system of barter carried on from a boat which plied back and forth on the James River and Kanawha Canal. There were twenty-two other military hospitals in Richmond, not counting accommodations for the sick in private houses, warehouses, churches and other public buildings. Captain Sallie Tompkins, head of the Robinson Hospital, was the only woman who held a commission in the Confederate military service. The circumstances under which she preserved her hospital, formerly an independent unit, constitute a very interesting episode of the War.

Besides McCaw, there were other Richmond doctors prominent in the military organization. Hunter McGuire, Medical Director of Jackson's Corps, rendered service which has been commemorated in a statue in the Capitol Square—the only monument to a physician in the city. John Syng Dorsey Cullen, long a distinguished physician of Richmond, was the medical director of Longstreet's Corps. Samuel P. Moore, Surgeon-General of the Confederate Army, made his home in Richmond after the War, and the site of the house in which he died may now be seen at the northwest corner of Grace and Jefferson Streets.



The Egyptian Building of the Medical College of Virginia at Richmond.

In medical journalism Richmond has taken the leading ro'e, no fewer than sixteen medical periodicals having been published at one time or another in the city. The first was the *Stethoscope and Virginia Medical Gazette,* 1851. One of them, the *Southern Clinic,* claimed in its columns that it enjoyed the largest circulation of any medical publication in the South. The present organ of the Medical Society of Virginia, the *Virginia Medical Monthly,* is published in Richmond. The Medical Society of Virginia was organized in Richmond in 1820. When it became state-wide, the local society assumed another name, and its lineal descendant, the Richmond Academy of Medicine, occupies handsome new quarters adjacent to the Library

*By Dr. Wyndham B. Blanton, Richmond, Va.

of the Medical College of Virginia, and immediately facing the Confederate Museum. The building, besides containing the auditorium of the Academy, committee rooms, a large banqueting hall, the Miller Library with its rare collection of old books, silhouettes, medical portraits, letters and curios, also serves as the headquarters of the Medical Society of Virginia.

Richmond is the home of the largest of the State's two medical schools, the Medical College of Virginia. This institution dates back to 1838, when it was founded as the Medical Department of Hampden-Sidney College. For nearly one hundred years it has played a leading role in the medical education of Virginia youths, numbering among its faculty the outstanding doctors of Richmond. It claims to be the only medical school in the South that did not close its doors during the War Between the States. As now organized, the College is divided into the co-ordinate schools of Medicine, Dentistry, Pharmacy, and Nursing, with a total enrollment last year of 754. In the School of Medicine with 351 matriculates, full-time professors are in charge of most of the preclinical courses, and of the important departments of medicine and surgery. Teaching is conducted in nine major buildings, the Memorial, Dooley, St. Philip's and the Crippled Children's Hospitals, the Outpatient Department (formerly the Virginia Hospital), McGuire Hall (formerly the University College of Medicine), the Egyptian Building (the original teaching unit and hospital of the College), the Library, Cabaniss Hall (a dormitory for white nurses), and the St. Philip's dormitory for colored nurses.

Richmond of the present day is well supplied with hospitals. Under the control of the Medical College are the Memorial Hospital at Eleventh and Broad Streets, opened July 27, 1903, and accommodating 188 white adult patients; the St. Philip and Dooley Hospitals, located between Eleventh and Twelfth Streets on Marshall, opened in the autumn of 1920 and accommodating 176 colored adult and 40 white infant patients, respectively, and the Crippled Children's Hospital on Brook Road, opened in the spring of 1928 and accommodating 60 children. Other charity-maintained hospitals are the City Home on North Second Street, the oldest hospital in the city with a bed capacity of 200, and a well-run department for contagious diseases attached; the Sheltering Arms Hospital on East Clay Street, opened in 1889, now supplying 78 beds; the Home for Incurables organized in 1894, occupying a beautiful new site in Byrd Park and capable of caring for 90 patients; Lee Camp Soldiers' Home Hospital at Boulevard and Grove, established in 1884 with 50 beds; and the Retreat for the Sick, organized in the spring of 1877 and now located in a new building on Grove Avenue, with a bed capacity of 100. Pine Camp Hospital with 214 beds for the care of the city's tuberculous poor is located just outside the city limits.

A large proportion of the hospital beds of Richmond are in private hands. St. Luke's Hospital, founded by Hunter McGuir in 1883 and now located at Harrison and Grace Streets, accommodating 87 medical and surgical patients; the Johnston-Willis Hospital, founded by the late George Ben Johnston and A. Murat Willis, located at Kensington and Colonial Avenues, accommodating 127 patients; Stuart Circle Hospital, on Monument Avenue, opened in 1913 and accommodating 80 patients; St. Elizabeth's Hospital at Pine and Grace, opened in 1911 and accommodating 55 patients, and the Grace Hospital at Monroe and Grace, opened in 1911 and accommodating 100 patients. Training schools for nurses are maintained in all of these private hospitals and most of them are centers of group practice, each institution differing somewhat from the other in the manner in which the principle of it is applied. All told, Richmond with a population of 183,000 has 340 physicians who practice in 15 hospitals with a bed capacity for charitable patients of 1,196, and for private patients of 489.

RICHMOND HOTELS

Richmond has good hotels, and those who plan to attend the meeting can be assured of comfortable hotel accommodations. If one writes to the hotel of his choice and does not hear within a reasonable time, or if any hotel has reservations beyond its capacity, the local Hotel Committee, of which Dr. J. Powell Williams, 1000 West Grace Street, Richmond, is Chairman, will be glad to see that comfortable accommodations are secured for any physician who may write. Dr. Williams and his Committee will take pleasure in being of service in any way they can to physicians contemplating attending the Richmond meeting. In writing the hotel, or Dr. Williams, state the kind and price of accommodations desired, the day reservation is to become effective, and if possible give time of day reservation is to begin.

HOTEL JOHN MARSHALL, 5th Street at East Franklin
(General Headquarters)
Single, shower bath, $3.00 to $5.00
Single, tub bath, $3.50 to $6.00
Double (double bed), tub or shower, $5.00 to $7.00
Double (twin beds), combination tub and shower, $6.00 to $10.00

JEFFERSON HOTEL, West Franklin
(Hotel Headquarters for American Society of Tropical Medicine; National Malaria Committee; Southern Branch, American Public Health Association; and Southern Section, Society for Experimental Biology and Medicine; and Woman's Auxiliary)
Single, without bath, $2.50
Double (double bed), without bath, $4.00
Single, with bath, $3.00
Double (double bed), with bath, $5.00
Double (twin beds), with bath, $6.00 to $8.00

HOTEL RICHMOND, 9th Street at East Grace
Single without bath, $1.50 to $2.50
Double, without bath, $3.00 to $4.00
Double (two double beds), without bath, $6.00
Single, with bath, $2.50 to $4.00
Double (double bed), with bath, $4.00 to $6.00
Double (two double beds), with bath, $10.00
Double (twin beds), with bath, $5.00 to $9.00

MURPHY'S HOTEL, East Broad at 8th Street
In Main Building
Single, without bath, $2.00
Double, without bath, $3.00
Single, with bath, $2.50 and $3.00
Double, with bath, $3.50 and $4.00
Double (twin beds), with bath, $4.50 to $6.00
In Grace Street Annex
Single, without bath, $1.50
Double, without bath, $2.50
Single, with bath, $2.00 and $2.50
Double, with bath, $3.00 and $3.50
Double (twin beds), with bath, $4.00

HOTEL RUFGER, 9th and Bank Streets
Single, without bath, $2.00
Double, without bath, $3.00 and $3.50
Single with bath, $2.75 and $3.25
Double, with bath, $4.00 and $5.00

HOTEL WILLIAM BYRD, West Broad Street at Davis Avenue
Single, with wash basin and toilet, $2.00 and $2.50
Double, with wash basin and toilet, $3.00 to $4.00
Double (twin beds), wash basin and toilet, $4.00 and $5.00
Single, with bath, $3.00 to $4.00
Double, with bath, $4.00 to $6.00
Double (twin beds), with bath, $5.00 to $8.00

After Richmond, Washington

THE POST-MEETING DAY IN WASHINGTON

The Southern Medical Association will have a post-meeting day in Washington, Saturday, November 18, immediately following the close of the regular annual meeting at Richmond, Virginia, November 14-17, inclusive.

The program for the post-meeting day will be very informal. A number of interesting things have been planned and are being arranged for. Reduced railroad rates from the South will apply to Richmond and Washington. A day or more may be spent in Washington following the Richmond meeting with interest and profit to all who attend the Richmond meeting.

The Association has named as the Committee for its post-meeting day in Washington, Dr. Thomas A. Groover, Chairman; Dr. Cary T. Grayson, Vice-Chairman; Dr. William Thornwall Davis; and Dr. William Gerry Morgan.

WASHINGTON, THE MEDICAL CENTER OF THE NATION*

One finds the eyes of not only the nation's medical profession turned toward Washington. Renowned medical centers of the Old World look upon the marvelous medical institutions in the Capital of the United States as models, and respect the little army of physicians, surgeons, specialists and others in the profession as foremost authorities.

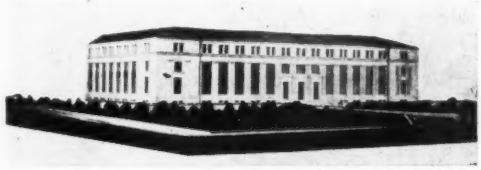
Lay visitors as well as professional visitors are interested in the vast wealth of material offered by medical activities in Washington.

It is estimated that more than 70,000 people visit the Army Medical Museum every year. Originated in 1862, the Army Medical Museum was primarily established to present items of interest in military medicine and surgery. Today, the Museum serves not only the Medical Department of the Army and other Federal agencies, but also the entire medical profession of the country through its consulting service and its file and microscopic slides and demonstrative material. The Museum has grown steadily and rapidly until today its collection is more than three times as large as at the outbreak of the World War.

Specimens illustrative of diseases of vital importance to any group of individuals, whether military or civilian, include historical medicine, embryology, anatomy, entomology, protozoology, helminthology and tropical medicine. General diseases, especially those of a contagious nature, and tumors are represented in a comprehensive manner, while the collections of instruments depict the medical and surgical progress of the centuries. Dental and veterinary medicine are likewise well represented. The gunshot fractures of the Civil War have world renown as likewise have specimens from the World War which illustrate the results of modern warfare. In addition to the gross exhibits there are innumerable histological preparations available for study by properly accredited visitors.

It is interesting to know that the Museum, together with its Library, may be moved into new headquarters as a result of the National Industrial Recovery Act. The two national institutions are at present housed in buildings constructed a century ago and they have outgrown their quarters. In 1919 Congress appropriated funds for the purchase of a suitable site for a new building for the Library and Museum. This site, a part of the Army Medical Center, is adjacent to the Walter Reed General Hospital and the Army Medical School. It was the intention of Congress to complete the Army Medical Center by the addition of the last two institutions so that, complete, it will correspond to the army medical centers of Great Britain, France and other countries. It is estimated that the proposed new building will cost $2,000,000 and officials are hopeful that it will be included in the Government's huge public works program.

The Army Medical Library is the largest medical library in the world. In a little more than a century the Library has grown to such proportions that it includes more than a million items, among which are its amazing collection of medical books from the earliest known manuscripts prior to the invention of printing down to the most recent monographs on special subjects, its files of portraits of medical interest, documents and the like.



New United States Public Health Service Building.

In the field of medical history there is no richer source of material than the Army Medical Library. Its collection of medical incunabula is easily the most extensive in the New World and is rivaled by but few in the old. Its collection of modern texts is unexcelled. Practically everything of value published in medical science is acquired by the Library, not only in America but also in every country and in every language. This Library subscribes to some 2,500 medical journals, all of which are on its shelves and are available to readers.

The "Index Catalogue" which lists all books and journal articles is the world's standard of medical bibliography and has been called in both Europe and this country "America's Greatest Contribution to Medicine." This work, now in its forty-eighth volume, is as extensively used in foreign countries as our own.

Worth visiting is the Army Medical Center, which includes the Center Headquarters, the Army Medical School, the Army Dental School, the Army Veterinary School, and the Walter Reed General Hospital.

The Walter Reed Hospital is one of the most important general hospitals operated by the Army. It has a normal capacity of one thousand patients, and is housed in commodious buildings particularly adapted to

*By Curtis Hodges, Executive Director of the Greater National Capital Committee of the Washington (D. C.) Board of Trade.

hospital purposes. It is well equipped with modern apparatus and appliances, and has an excellent staff of efficient administrators and specialists.

All visitors in Washington, especially those in the medical profession, will be interested in seeing the Public Health Service in its new administration building. This building occupies an entire square on Constitution Avenue, is four stories high, and marked by simple, dignified lines. In proportions, the structure exhibits a classical Greek feeling, but the details bear the mark of modern architectural thought. The total cost of the building was $908,000 exclusive of the cost of the site.

Inasmuch as the Public Health Service is largely a field service, that is, its activities are scattered throughout the United States and certain foreign countries, there is little of the field activity work in Washington, except in its most important research laboratory, the National Institute of Health. Here the Public Health Service conducts studies relating to the diseases of man.

Perhaps the most important function of the Public Health Service carried on at the National Institute of Health is the supervision and control of biologic products. All viruses, vaccines, therapeutic serums, toxins, antitoxins and similar products applicable to the prevention and cure of the diseases of man are tested by the Public Health Service for purity and potency. The value of such products supervised by the Service in one year is well over $10,000,000.

New buildings are now being constructed at the Institute, and it is expected that within the next few months the new laboratory buildings will be occupied. This will materially enlarge the laboratory facilities for the work of the Institute.

With the appointment this year of some of the outstanding men in the medical world to the George Washington University and Georgetown University faculties, Washington offers two of the finest schools of medicine in the country.

Dr. Owen Stanley Biggs, well-known British medical scientist and former Rockefeller scholar, has been named head of the Department of Physiology at Georgetown. He is widely recognized in medical circles for his important research in pharmacology and physiology and has done more than any other scientist, perhaps, to perfect what is generally termed a "mechanical heart." Medical students at Georgetown have at their disposal the facilities of Georgetown University Hospital, one of the oldest and best known in Washington.

Outstanding in the faculty appointments at George Washington University this year is that of Dr. Edward Bright Vedder, former Director of the Army Medical School, as professor of experimental medicine and executive officer of the department of pathology and experimental medicine. The development of the program in scientific medicine and public health at the George Washington University is reflected in the appointment of five instructors and one teaching fellow in the School of Medicine and in additional courses in the departments of bacteriology, hygiene and preventive and experimental medicine.

Howard University will begin its sixty-seventh year when it opens this month with one of the best schools of medicine for negroes in the country. Its College of Medicine is rated by the American Medical Association as class A and is a member of the Association of American Medical Colleges.

The surface of the medical activities in Washington has hardly been scratched in this article. But what has been written suffices to prove that Washington is the medical center of the nation. And if its progress continues as it has done during the last few years, it will undoubtedly stand out, in the near future, as the foremost medical center of the world.

WASHINGTON HOTELS

FOR SOUTHERN MEDICAL ASSOCIATION POST-MEETING DAY, SATURDAY, NOVEMBER 18.

THE MAYFLOWER
(General Headquarters)
Single, with bath, $3.50
Double (double bed), with bath, $5.00
Double (twin beds), with bath, $6.00

THE WILLARD
Single, with bath, $3.50
Double, with bath, $5.00

HOTEL WASHINGTON
Single, with bath, $3.50 and $4.50
Double (double bed), with bath, $4.00 and $5.00
Double (twin beds), with bath, $6.00 and $7.00

Book Reviews

History of Urology. Prepared under the Auspices of the American Urological Association. Editorial Committee: Edgar G. Ballenger, William A. Frontz, Homer G. Hamer and Bransford Lewis, Chairman. Baltimore: The Williams & Wilkins Company, 1933. Price of the two volumes, $8.00 (not sold separately).

Three members of the editorial commitee for this History of Urology, Dr. Edgar G. Ballenger, of Atlanta, Dr. William A. Frontz, of Baltimore, and Dr. Bransford Lewis, of St. Louis, Chairman, are members of the Southern Medical Association, and are well known in American urology. The two volumes are made up of separate essays by many authors upon such subjects as the history of the American Urological Association, the history of urology in various localities in America, as Baltimore, Boston, Chicago and the West Coast. The history of anesthesia, focal infections, kidney surgery, lithiasis, prostate, urological diagnosis, neuroses and functional diseases of the genito-urinary tract, bladder tumors, and so on, receive separate attention. Among Southern contributors, in addition to the members of the editorial committee, are John R. Caulk, of St. Louis; Owsley Grant, of Louisville; A. J. Crowell, of Charlotte, North Carolina; Alfred I. Folsom, of Dallas; Albert E. Goldstein, of Baltimore; Clinton Smith, of Kansas City; and H. W. E. Walther, of New Orleans. Well known names from other sections are those of Hermon Bumpus, of Rochester; John Chalmers Da Costa, of Philadelphia; Edward L. Keyes, of New York; and Herman Kretschmer, of Chicago.

There is necessarily some repetition in a book by a number of authors, but the reader has the advantage of securing a breadth of viewpoint which is of value and interest. This series of essays gives a full and accurate picture of a specialty. They will be found very good reading.

BOOK REVIEWS continued on page 907

OFFICERS 1932-1933

The following is a complete roster of the officers of the Southern Medical Association for 1932-1933, of organizations meeting conjointly with the Southern Medical Association in 1933, and of the host society, the Richmond Academy of Medicine.

President—Dr. Irvin Abell, Louisville, Kentucky.

First Vice-President—Dr. James R. Garber, Birmingham, Alabama.

Second Vice-President—Dr. Hugh J. Morgan, Nashville, Tennessee.

Secretary-Manager—Mr. C. P. Loranz, Birmingham, Alabama.

Editor of Journal—Dr. M. Y. Dabney, Birmingham, Alabama.

Assistant Editor of Journal—Mrs. Eugenia B. Dabney, Birmingham, Alabama.

Councilors—Dr. Homer Dupuy, Chairman, New Orleans, Louisiana; Dr. M. Toulmin Gaines, Mobile, Alabama; Dr. Morgan Smith, Little Rock, Arkansas; Dr. William Gerry Morgan, Washington, D. C.; Dr. Edward Jelks, Jacksonville, Florida; Dr. Frank K. Boland, Atlanta, Georgia; Dr. C. W. Dowden, Louisville, Kentucky; Dr. Edward A. Looper, Baltimore, Maryland; Dr. Inman W. Cooper, Meridian, Mississippi; Dr. M. Pinson Neal, Columbia, Missouri; Dr. Paul H. Ringer, Asheville, North Carolina; Dr. Lea A. Riely, Oklahoma City, Oklahoma; Dr. Frank H. McLeod, Florence, South Carolina; Dr. Eugene Rosamond, Memphis, Tennessee; Dr. Elbert Dunlap, Dallas, Texas; Dr. R. Finley Gayle, Jr., Richmond, Virginia; Dr. James R. Bloss, Huntington, West Virginia.

Board of Trustees (All are Past-Presidents)—Dr. J. Shelton Horsley, Chairman, Richmond, Virginia; Dr. William R. Bathurst, Little Rock, Arkansas; Dr. Thomas W. Moore, Huntington, West Virginia; Dr. Hugh S. Cumming, Washington, D. C.; Dr. Felix J. Underwood, Jackson, Mississippi; Dr. L. J. Moorman, Oklahoma City, Oklahoma.

Section on Medicine—Dr. I. I. Lemann, Chairman, New Orleans, Louisiana; Dr. Cabot Lull, Vice-Chairman, Birmingham, Alabama; Dr. Ernest B. Bradley, Secretary, Lexington, Kentucky.

Section on Pediatrics—Dr. Hugh L. Dwyer, Chairman, Kansas City, Missouri; Dr. Charles E. Conrad, Vice-Chairman, Harrisonburg, Virginia; Dr. Luther W. Holloway, Secretary, Jacksonville, Florida.

Section on Gastroenterology—Dr. Daniel N. Silverman, Chairman, New Orleans, Louisiana; Dr. James Alto Ward, Vice-Chairman, Birmingham, Alabama; Dr. Ernest H. Gaither, Secretary, Baltimore, Maryland.

Section on Pathology—Dr. J. A. McIntosh, Chairman, Memphis, Tennessee; Dr. Harvey S. Thatcher, Vice-Chairman, Little Rock, Arkansas; Dr. Wiley D. Forbus, Secretary, Durham, North Carolina.

Section on Neurology and Psychiatry—Dr. R. G. Spurling, Chairman, Louisville, Kentucky; Dr. W. W. Young, Vice-Chairman, Atlanta, Georgia; Dr. J. H. Royster, Secretary, Richmond, Virginia.

Section on Radiology—Dr. C. H. Heacock, Chairman, Memphis, Tennessee; Dr. K. F. Kesmodel, Vice-Chairman, Birmingham, Alabama; Dr. Vincent W. Archer, Secretary, University, Virginia.

Section on Dermatology and Syphilology—Dr. Andrew L. Glaze, Chairman, Birmingham, Alabama; Dr. Jack W. Jones, Vice-Chairman, Atlanta, Georgia; Dr. Dudley C. Smith, Secretary, University, Virginia.

Section on Surgery—Dr. Edwin P. Lehman, Chairman, University, Virginia; Dr. Samuel L. Ledbetter, Jr., Vice-Chairman, Birmingham, Alabama; Dr. Daniel C. Elkin, Secretary, Atlanta, Georgia.

Section on Bone and Joint Surgery—Dr. J. Albert Key, Chairman, St. Louis, Missouri; Dr. H. Earle Conwell, Vice-Chairman, Fairfield, Alabama; Dr. J. Warren White, Secretary, Greenville, South Carolina.

Section on Gynecology—Dr. Percy H. Wood, Chairman, Memphis, Tennessee; Dr. John W. Turner, Vice-Chairman, Atlanta, Georgia; Dr. Lee F. Turlington, Secretary, Birmingham, Alabama.

Section on Obstetrics—Dr. E. L. King, Chairman, New Orleans, Louisiana; Dr. Percy W. Toombs, Vice-Chairman, Memphis, Tennessee (deceased); Dr. Richard Paddock, Secretary, St. Louis, Missouri.

Section on Urology—Dr. Nelse F. Ockerblad, Chairman, Kansas City, Missouri; Dr. I. G. Duncan, Vice-Chairman, Memphis, Tennessee; Dr. Hamilton W. McKay, Secretary, Charlotte, North Carolina.

Section on Railway Surgery—Dr. E. Dunbar Newell, Chairman, Chattanooga, Tennessee; Dr. S. O. Black, Vice-Chairman, Spartanburg, South Carolina; Dr. J. W. Palmer, Secretary, Ailey, Georgia.

Section on Ophthalmology and Otolaryngology—Dr. William D. Gill, Chairman, San Antonio, Texas; Dr. E. W. Rucker, Jr., Vice-Chairman, Birmingham, Alabama; Dr. William A. Wagner, Secretary, New Orleans, Louisiana.

Section on Medical Education—Dr. John Walker Moore, Chairman, Louisville, Kentucky; Dr. Earl B. McKinley, Vice-Chairman, Washington, D. C.; Dr. Ernest W. Goodpasture, Secretary, Nashville, Tennessee.

Section on Public Health—Dr. Joseph W. Mountin, Chairman, Washington, D. C.; Dr. Leon Banov, Vice-Chairman, Charleston, South Carolina; Dr. Douglas L. Cannon, Secretary, Montgomery, Alabama.

National Malaria Committee (meeting conjointly with Southern Medical Association)—Dr. L. O. Howard, Honorary Chairman, Washington, D. C.; Dr. Charles F. Craig, Chairman, New Orleans, Louisiana; Dr. Henry Hanson, Chairman-Elect, Jacksonville, Florida; Dr. L. L. Williams, Jr., Vice-Chairman, Washington, D. C.; Dr. Mark F. Boyd, Secretary-Treasurer, Tallahassee, Florida.

American Society of Tropical Medicine (meeting conjointly with Southern Medical Association)—Dr. G. R. Callender, President, Fort Sam Houston, Texas; Dr. A. W. Sellards, First Vice-President, Boston, Massachusetts; Dr. W. A. Sawyer, Second Vice-President, New York, New York; Dr. Henry E. Meleney, Secretary-Treasurer, Nashville, Tennessee; Dr. Damaso de Rivas, Assistant Secretary, Philadelphia, Pennsylvania.

American Public Health Association, Southern Branch (meeting conjointly with Southern Medical Association)—Dr. E. L. Bishop, President, Nashville, Tennessee; Dr. J. H. Mason Knox, Jr., First Vice-President, Baltimore, Maryland; Dr. J. D. Dowling, Second Vice-President, Birmingham, Alabama; Miss Margaret East, Third Vice-President, Louisville, Kentucky; Dr. R. H. White, Secretary-Treasurer, Nashville, Tennessee.

Society for Experimental Biology and Medicine, Southern Section (meeting conjointly with Southern Medical Association)—Dr. Ernest Carroll Faust, Chairman, New Orleans, Louisiana; Dr. Harold Cummins, Vice-Chairman, New Orleans, Louisiana; Dr. Charles F. Craig, Secretary, New Orleans, Louisiana.

Women Physicians of Southern Medical Association—Dr. Ray K. Daily, Chairman, Houston, Texas; Dr. Rosalie Slaughter Morton, Vice-Chairman, Winter Park, Florida; Dr. Willena Peck, Secretary, Montevallo, Alabama.

Woman's Auxiliary to the Southern Medical Association—Mrs. A. A. Herold, President, Shreveport, Louisiana; Mrs. Southgate Leigh, President-Elect, Norfolk, Virginia; Mrs. J. Bonar White, First Vice-President, Atlanta, Georgia; Mrs. Sidney W. Collier, Second Vice-President, Birmingham, Alabama; Mrs. Earl D. McBride, Recording Secretary, Oklahoma City, Oklahoma; Mrs. C. B. Erickson, Corresponding Secretary, Shreveport, Louisiana; Mrs. W. B. Majors, Treasurer, Birmingham, Alabama; Mrs. J. D. Thompson, Historian, Port Arthur, Texas; Mrs. V. A. Stilley, Parliamentarian, Benton, Kentucky.

RICHMOND ACADEMY OF MEDICINE, Richmond, Virginia, Host to the Southern Medical Association, Twenty-Seventh Annual Meeting, November 14-17, 1933.

President, Dr. Carrington Williams. *First Vice-President*, Dr. Turner S. Shelton. *Second Vice-President*, Dr. J. Powell Williams. *Secretary-Treasurer*, Dr. Thomas D. Jones. *Chairman of Program Committee*, Dr. Karl S. Blackwell. *Chairman Board of Trustees*, Dr. Wyndham B. Blanton. *Chairman Board of Censors*, Dr. Joseph F. Geisinger.

Chairmen of Local Committees on Arrangements

General Chairman, Dr. Fred M. Hodges. *Honorary Vice-General Chairmen*, Dr. Stuart McGuire, Dr. J. Shelton Horsley, and Dr. James K. Hall. *Finance*, Dr. W. H. Higgins. *Entertainment*, Dr. Beverley R. Tucker. *Program or Clinics*, Dr. I. A. Bigger. *Meeting Places*, Dr. R. Finley Gayle, Jr. *Hotels*, Dr. J. Powell Williams. *Publicity*, Dr. Joseph F. Geisinger. *Scientific Exhibits*, Dr. W. Ambrose McGee. *Technical Exhibits*, Dr. J. B. Dalton. *Alumni Reunions and Fraternity Luncheons*, Dr. H. H. Ware, Jr. *Membership*, Dr. C. M. Caravati. *Information*, Dr. J. S. Horsley, Jr. *Transportation*, Dr. Arthur S. Brinkley. *Signs and Badges*, Dr. Garland Harwood. *Lanterns*, Dr. J. L. Tabb. *Golf*, Dr. Paul W. Howle. *Trap Shooting*, Dr. W. B. Porter. *Women Physicians*, Dr. Pauline Williams. *Ladies' Entertainment*, Mrs. Stuart McGuire, Chairman; Mrs. J. B. Dalton, Vice-Chairman.

Book Reviews

BOOK REVIEWS continued from page 905

The Collected Papers of the Mayo Clinic and the Mayo Foundation for 1931. Volume XXIII. Edited by Mrs. Maud H. Mellish-Wilson and Richard M. Hewitt, B.A., M.A., M.D. Octavo volume of 1231 pages with 265 illustrations. Philadelphia and London: W. B. Saunders Company, 1932. Cloth, $13.00.

In a literature which contains many conflicting statements and opinions, the great volume of medical and surgical cases on which the annual Mayo Clinic volume would give it a place of authority, even if its report were not well put together. The papers are, however, well abstracted and selected. A large number of rare and common conditions are analyzed. For example, there is a report of 76 cases of ureteral transplantations to the rectosigmoid and of 20 cases of Addison's disease treated with the suprarenal cortical extract of Swingle and Pfiffner. In a paper entitled "How Early Do Physicians Diagnose Cancer of the Stomach in Themselves," 41 cases are analyzed. The records of nearly 4,000 gastric analyses are reported. Further experimental studies upon liver function are described. This is but to mention a few subjects which strike the eye in going through the index.

The volume represents an outstanding accomplishment by a large and capable staff.

Fractures. By Paul B. Magnuson, M.D., Associate Professor of Surgery, Northwestern University Medical School, Chicago. 466 pages with 317 illustrations. Philadelphia: J. B. Lippincott Company, 1933. Cloth, $5.00.

This book is a valuable contribution to the needs of every day practice and should be of great benefit to the physician who first sees the fracture. The content may not be so thorough nor so strictly scientific as other texts, but it is clear, briefly expressed, and easy to read. In only a few instances is the operative treatment of fractures discussed. The methods given are the results chiefly of the author's personal experience.

Peptic Ulcer. By Jacob Buckstein, M.D., Instructor in Gastro-intestinal Roentgenology, Cornell University Medical College. Second Edition, Revised and Enlarged. 277 pages, illustrated. Volume 10 of Annals of Roentgenology, a Series of Monographic Atlases, Edited by James T. Case, M.D., Professor of Roentgenology, Northwestern University Medical School. New York: Paul B. Hoeber, Inc., 1933. Cloth, $12.00.

The second edition of Buckstein's "Peptic Ulcer" demonstrates the perfection of the art and science of gastric roentgenology; and, in addition, discusses the pathological anatomy of gastric and duodenal ulcers. Buckstein's case histories bring out the symptoms and the pathological findings as related to the x-ray pictures. He has included in his roentgenograms every conceivable type and complication of gastric and duodenal ulcer. The more than 400 illustrations, pathologic and roentgenologic, are beautifully executed. The book is a valuable contribution to the study of gastric and duodenal ulcers.

The History and Epidemiology of Syphilis. By Wm. Allen Pusey, A.M., M.D., LL.D., Professor of Dermatology Emeritus, University of Illinois; Sometime President of the American Dermatological Association and of the American Medical Association. 113 pages, illustrated. Springfield, Illinois: Charles C. Thomas, publishers, 1933. Cloth, $2.00.

Many names contributed to the study of this malady from the Sixteenth Century to the present day. Dr. Pusey, in smoothly flowing language, with a large number of photographs of the early investigators, does justice to all. It will be noted that this widely known dermatologist accepts the theory of the American origin of syphilis. The volume is excellently typed, attractively arranged and enjoyable.

The Control of Football Injuries. By Marvin Allen Stevens, M.D., Assistant in Surgery, New Haven Hospital; Head Football Coach, Yale University (1928-1932), and Winthrop Morgan Phelps, M.D., Professor of Orthopedics, Yale University. 241 pages, illustrated. New York: A. S. Barnes & Co., 1933. Cloth, $3.00.

A short, non-technical monograph written by a physician-coach in conjunction with the head of the orthopedic department of Yale University. Equipment conducive to the prevention of injury to the wearer or his opponent is emphasized. Blocking, tackling, driving and other phases of play by methods least likely to result in injury are covered both by discussion and copious illustrations. Types of injuries received in play and practice and their treatment are taken up. The authors conclude with a statistical investigation of football fatalities and injuries. The keynote of the entire book is injury prevention.

Binocular Vision and the Modern Treatment of Squint. By Margaret Dobson, M.D. (Lon.), Ophthalmic Surgeon to the New Sussex Hospital for Women and Children, Brighton; Oculist in Charge of the Kilburn (L.C.C.) Eye Clinic. 107 pages, illustrated. New York: Oxford University Press, 1933. Cloth, $2.75.

The oculist will find here detailed methods of orthoptic training in readily accessible form.

Heretofore the literature in this field of ophthalmology has been dominated by the refractionist and the ophthalmic surgeon. This book compiles the modern methods and improved instruments used for the re-education of unbalanced eye muscles.

Proceedings of the First International Congress on Mental Hygiene. Held at Washington, D. C., U.S.A., May 5 to 10, 1930. Edited by Frankwood E. Williams, M.D. Volumes I and II. 840 pages. New York: The International Committee for Mental Hygiene, Inc., 1932.

These reports are the first collected data covering mental hygiene as it is being practiced over the entire world. Fifty-two countries were represented at the Congress. In addition to the reports of the committees a large number of original papers were read. These reports and papers will constitute a yard stick with which to measure the future advances of this phase of medicine.

Red Blood Cell Diameters. By Cecil Price-Jones, M.B. (Lon.). 80 pages. New York: Oxford University Press, 1933. Cloth, $3.50.

This short volume presents results of several years of original work concerning the physiological and pathological variations in the size of the red blood cells. The author has used the statistical method of study and his conclusions, being based on much laborious work, appear to be well proven. The book will probably be confusing to readers who are not trained in statistical methods, but it should be of value to investigators in the field of hematology.

Aside from the mathematics the text is easily comprehensible and is well written. The first chapter, which contains an historical review, is of especial interest.

The Story of Childbirth. By Dr. Palmer Findley. 376 pages, illustrated. New York: Doubleday, Doran & Co., 1933. Cloth, $3.00.

Dr. Palmer Findley tells the story of childbirth from the earliest mythology to the present time. He contrasts the practices of the ancients, the savages and those of not so long ago with the usages of today. The chapter about labor is most interesting in its illustrations of methods and appliances that were in use among different peoples. The inclusion of the standards of prenatal care formulated by the White House Conference is to be commended. Every physician, father, nurse and mother should read and conform to them. Numerous fallacies are exploded, among them the idea that dieting will make smaller babies. It is exercise that does the trick. Other subjects are venereal disease, birth control and the spacing of children. The writer is thoroughly honest, conscientious and conservative, avoiding the sensational in presenting the subject in lay language. A book of this character will do much to popularize the high ideals of modern obstetrics.

Health and Environment. By Edgar Sydenstricker. 217 pages. New York and London: McGraw-Hill Book Company, Inc., 1933.

This book is one of a series of monographs published under the direction of the President's Research Committee on Social Trends. Its greatest value lies in the showing of the lack of scientific data in regard to health and environment. Certain phases have been adequately surveyed and exhaustively studied, but even in these it is necessary to work over the "crude" data into a truthful fact. An example is the fact that in the assembly of death statistics the place of death rather than the residence is given the important emphasis. This gives to those towns or places with the best hospital facilities the highest death rates. "Many of the variations among individuals with respect to mortality, morbidity and physical impairment are due chiefly to environmental factors. The span of life has not changed appreciably though environmental changes have caused a decline in the death rate of persons under 40 or 50 years of age. . . . . On the whole the prevention of that mortality and that ill health which are demonstrably due to unfavorable environment will not weaken the race."

Southern Medical News

ALABAMA

The Bryce Hospital, Tuscaloosa, recently was presented with a portrait of the late Dr. Albert Gallatin Mabry, one of the first trustees of the Alabama Insane Hospitals, and connected with the early history of the Bryce Hospital. The portrait will hang in the "Hall of Fame" of the institution along with pictures of other distinguished persons in the history of the Alabama hospitals, which have been assembled through the efforts of Dr. William D. Partlow, Superintendent.

Dr. Andrew L. Glaze, Birmingham, announces his removal to new offices in the Medical Arts Building.

Dr. James Porter Collier, Birmingham, and Miss Virginia Slade Lacey were married July 8.

Deaths

Dr. Barney Burns Rogan, Selma, aged 57, died July 1 of uremia.

Dr. Gross Scruggs Chapman, Jackson, aged 77, died June 25 of valvular heart disease.

Dr. Wyatt Heflin Blake, Sheffield, aged 77, died July 9 of cerebral hemorrhage.

Dr. William Davison Nettles, McKenzie, aged 49, died suddenly July 5 of heart disease.

ARKANSAS

The Craighead, Greene, Lawrence, Randolph and Clay County Medical Societies entertained jointly at a fish fry in July. Dr. L. J. Kosminsky, President of the State Medical Society, and Dr. W. B. Grayson, State Health Officer, gave talks.

The staffs of the Leo N. Levi Memorial Hospital, Hot Springs National Park, and the Charles Steinberg Clinic will meet October 5th for their third Clinical Conference, with Dr. Ralph A. Kinsella, St. Louis, as the guest speaker.

Dr. W. H. Bruce, Morrilton, has been appointed to succeed Dr. A. B. Jemison as Health Officer for Pine Bluff and Jefferson County, Dr. Jemison having been appointed to the State Health Department as epidemiologist and director of milk and malarial control.

Dr. James D. Kinley, formerly of Little Rock, has located in Beebe.

Deaths

Dr. William Ray Bathurst, Little Rock, aged 57, Secretary of the Arkansas State Medical Society, a past president of the Southern Medical Association and a member of its Board of Trustees, died suddenly August 30.

Dr. Susan Fairfield Laird, Blytheville, aged 75, died May 25 of cerebral hemorrhage.

Dr. W. M. Weatherall, Star City, aged 64, died June 12 of gastritis.

Dr. Enoch David Wall, Marianna, aged 52, died July 9 of amebiasis and cerebral hemorrhage.

Dr. William L. Rieff, Perryville, aged 73, died June 30 of endocarditis.

Dr. Samuel D. Hodge, Bald Knob, aged 65, died suddenly June 28 of heart disease.

Dr. Lem H. Lipsey, Wynne, aged 65, died July 12 of carcinoma of the throat.

Dr. George M. Denton, Manila, aged 52, died July 8.

Dr. Thomas N. Rodman, Batesville, aged 65, died July 20.

DISTRICT OF COLUMBIA

Dr. Thomas A. Groover, Chairman; Dr. Cary T. Grayson, Vice-Chairman; Dr. William Thornwall Davis; and Dr. William Gerry Morgan are the Committee for the Southern Medical Association's post-meeting day in Washington, Saturday, November 18.

Dr. George Tully Vaughan, Washington, has been made Professor Emeritus of Surgery at Georgetown University School of Medicine, having resigned as Professor of Surgery after thirty-five years of service.

Dr. James A. Cahill, Jr., Washington, has been appointed to succeed Dr. George Tully Vaughan as Professor of Surgery at Georgetown University School of Medicine.

Dr. Joseph Rogers Young, Washington, and Miss Anne Beverley Sinclair were married in July.

Deaths

Dr. Henry Cottrell Rowland, Washington, aged 59, died June 6 of asphyxia due to lymphosarcoma.

Dr. John R. Sharp, Washington, aged 57, died July 10 of cerebral embolus and coronary thrombosis.

Continued on page 22

The uniform sharpness of Bard-Parker Blades is maintained only by unceasing vigilance in every step of manufacture, from the raw steel to the final inspection of each blade. For clean cutting performance always use a new razor sharp Bard-Parker blade. Prices: Handles, all sizes—$1.00 each. Blades, all sizes—$1.50 per dozen. Quantity discount of 10% on 1 to 5 gross of blades. 15% on 5 gross or more.

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It's Sharp

Continued from page 908

Dr. Sarah Marinda Loguen Frazer, Washington, aged 83, died April 9 of bronchopneumonia and fracture of the femur.

Dr. John Van Rensselaer, Washington, aged 70, died July 8.

FLORIDA

Dr. James G. Lyerly has located at Jacksonville with offices in the St. James Building, where he will practice neurological surgery, having come from Richmond, Virginia, where he was assistant professor of neurological surgery at the Medical College of Virginia.

Dr. A. E. Drexel, Palatka, has opened an office at Hastings in the Florida Power and Light Building, where he will observe office hours on Monday, Wednesday and Friday of each week.

Dr. W. G. Miles, Chattahoochee, has resigned as assistant physician of the Florida State Hospital and opened offices in Orlando for the practice of neuro-psychiatry.

Dr. Kenneth Phillips, Miami, is located in new offices at 609 Huntington Building.

Dr. J. Knox Simpson, Jacksonville, visited clinics and hospitals in several Northern cities in August, including The Mayo Clinic at Rochester.

Dr. Raymond Graves, Miami, sailed for Europe recently, where he will do special work in Vienna.

Dr. Elbert McLaury, Hollywood, is doing special work in several Eastern hospitals.

Members and their families of the Pasco-Hernando-Citrus County Medical Society were entertained recently by Dr. and Mrs. P. J. Hudson, Crystal River, with a boat trip, fish fry and picnic lunch.

The Orange County Medical Society held its annual picnic in July at Lakeside Park in Orlando.

Dr. W. C. McConnell, St. Petersburg, recently returned from attendance of clinics at the Elgin, Illinois, State Hospital.

Dr. Iva C. Youmans and Dr. C. P. Youmans, Miami, have moved their offices and laboratory from the Professional Building to 653 Southwest Second Street.

Dr. Aaron Z. Oberdorfer, Jacksonville, formerly on the resident staff of the Duval County Hospital, has opened offices in the St. James Building.

Dr. Homer L. Pearson, Miami, has moved into new offices in the Huntington Building.

The Central Florida Medical Society met at Ocala in July for their semi-annual session and elected the following officers for the coming year: Dr. Leroy H. Oetjen, Leesburg, President; Dr. J. L. Chalker, Ocala, Dr. S. C. Wood, Leesburg, Dr. E. H. Andrews, Gainesville, Vice-Presidents; and Dr. R. H. Williams, Eustis, Secretary-Treasurer.

Dr. Jesse Newman McLane, Pensacola, and Miss Marguerite Brittain Thompson were married in May.

DEATHS

Dr. William John Shields, Sarasota, aged 61, died June 24 in a Cleveland hospital of cerebral hemorrhage.

Dr. Shandy Z. Holland, Daytona Beach, aged 72, died May 21 of hypostatic pneumonia.

Dr. Frederick Schavoir, St. Petersburg, aged 73, died July 9 of diabetic gangrene and hypertension.

Dr. Van Henry Gwinn, Jacksonville, aged 64, died July 8.

GEORGIA

The First Annual Scientific Meeting of the Georgia Pediatric Society will be held in Atlanta October 12, with luncheon and afternoon session scheduled for the Biltmore Hotel and a buffet supper and evening session at the Academy of Medicine Building.

Extension courses sponsored by the Medical Association of Georgia, and arranged for by members of the Clarke, Troup, Floyd, Bulloch-Candler-Evans and Lowndes Counties Societies, were held June 19 and July 21 at Athens, LaGrange, Rome, Statesboro and Valdosta. Speakers on the program were Dr. M. K. Bailey, Dr. Frank K. Boland, Dr. M. L. Boyd, Dr. Dan C. Elkin, Dr. W. L. Funkhouser, Dr. F. G. Hodgson, Dr. James E. Paullin, Dr. M. Hines Roberts, Dr. Stewart R. Roberts, and Dr. C. W. Strickler, all of Atlanta.

Dr. J. P. Kennedy, Atlanta, has been reelected for another term of four years as City Health Officer of Atlanta.

Continued on page 24

RELIEF IN CYSTITIS

THE RESULT OF PYRIDIUM ORALLY ADMINISTERED

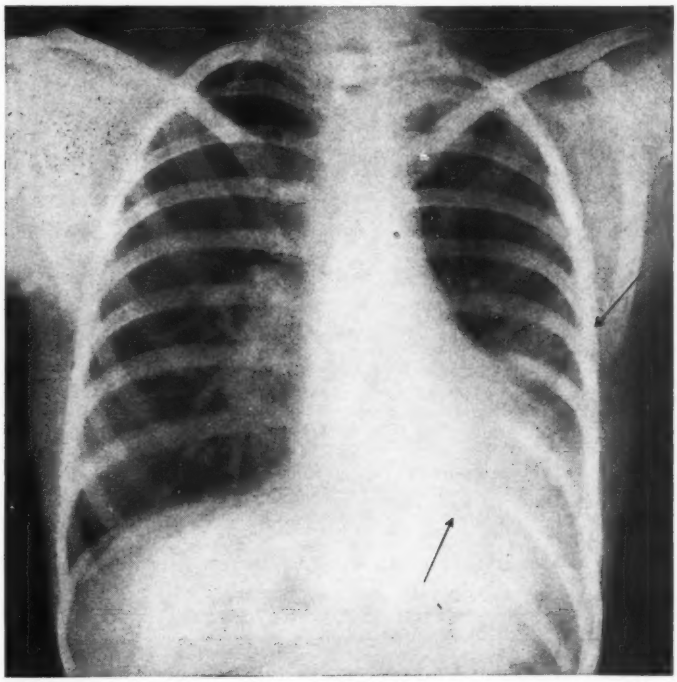
With the oral administration of Pyridium a clearing of cloudy urine may be expected in cases of urinary infection. Prompt relief of the distressing symptoms that often accompany such conditions as cystitis, pyelitis, and urethritis is usually obtained.

MERCK & CO. Inc.

Manufacturing Chemists

• RAHWAY, N. J. •

This *is* "T.b."



• *Tuberculosis of lower lobe of left lung. Lesion indicated by arrows.*

PATIENTS whose history or occupation predisposes them to respiratory infection are met regularly in medical practice. The clinical symptoms and auscultation and percussion may indicate lung impairment. Tuberculosis is a possibility.

Waiting for further symptoms to develop is hazardous and unnecessary. For delay in recognizing respiratory infection in its early stages hampers treatment—retards recovery.

These cases should be referred to your radiologist. If the disease is present, radiographs will say, "This *is* tuberculosis."

Radiography is definite. It alone is decisive in detecting tuberculosis in the first stages. And a series of radiographs is the most effective means of following the disease through its course. They show its progress and aid in prognosis and treatment.

Accurate Diagnostic Information

Maximum speed, yet freedom from fog; contrast, yet unvarying photographic qualities make Eastman Ultra-Speed Safety X-ray Film ideal for chest radiography. With them the radiographic findings are accurate . . . for all diagnostic detail is recorded.

If you will mail the coupon at the right, your name will be placed on the list for the free magazine, "Radiography and Clinical Photography."

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Gentlemen: Please send me the free publication, "Radiography and Clinical Photography."

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Continued from page 22

The Carrollton Clinic, at Carrollton, has recently reopened in a modern building with improved facilities for the care and treatment of patients.

Funds have been provided in the will of the late Honorable Linwood C. Hayne for the establishment of a charitable hospital at Augusta for the care and treatment of incurables.

Dr. and Mrs. R. B. Lamb, Demorest, were hosts recently to members of the Habersham County Medical Society and the Auxiliary.

Dr. A. W. DeLoach and Dr. C. M. Stephens, Waycross, recently entertained members of the Ware County Medical Society at dinner, followed by the regular meeting of the Society.

Dr. C. L. Pennington, Macon, has associated with him Dr. Ford Ware, formerly of Americus and Mooresville, North Carolina, for the practice of diseases of the eye, ear, nose and throat, with offices in the Doctors Building.

Dr. H. M. Tolleson, Hahira, was host recently to the members of the Lowndes County Medical Society at a chicken supper.

A chest clinic was held at Millen in August by Dr. Guy G. Lunsford, Millen, Jenkins County Commissioner of Health, in cooperation with representatives of the State Tuberculosis Sanatorium.

The Telfair County Medical Society met at Lumber City in August for a scientific meeting and fish dinner.

Dr. C. C. Brannon, Moultrie, addressed a recent meeting of the Moultrie Kiwanis Club on "Medical Costs and the Future of Healing."

The Leon Moye Medical Society, composed of Montgomery, Tooms, Treutlen and Wheeler Counties, held a reorganization meeting at Vidalia recently, at which time the following officers were elected for the coming year: Dr. J. E. Mercer, Vidalia, President; Dr. J. W. Palmer, Ailey, Vice-President; and Dr. William W. Aiken, Lyons, Secretary-Treasurer.

Dr. Harvey Van Buren, Statesboro, and Miss Hazel Marie Davis were married in June.

Dr. William Waugh Turner, Jr., and Miss Ruby Christina Gaskins, both of Nashville, were married in July.

Dr. Thomas Luther Byrd, Atlanta, and Miss Lillian Smith were married in June.

Deaths

Dr. William Lincoln Barnes, Atlanta, aged 70, died June 24 of diabetes mellitus.

Dr. John M. Christian, Hamilton, aged 59, died May 2 of chronic myocarditis.

Dr. Norman E. Benson, Albany, aged 56, died July 4 of myocarditis.

Dr. Henry M. McHan, Fair Mount, aged 80, died July 10.

Dr. W. D. Woods, Portal, aged 66, died February 2 of pneumonia.

Dr. S. M. Johnson, Wrightsville, aged 74, died August 31 of heart disease.

Dr. Thomas C. Cannon, Jonesboro, aged 75, died July 16.

Dr. Thomas Spencer Layton, Hinesville, aged 75, died suddenly June 30.

KENTUCKY

The Kentucky State Medical Association held its annual meeting in Murray September 11-14.

Dr. William Snyder, Frankfort, was the recipient recently of the degree of Master of Science, conferred upon him by the University of Pennsylvania.

Dr. J. Ernest Fox, formerly Superintendent of Central State Hospital at Lakeland, and more recently Resident Physician of High Oaks Sanatorium, Lexington, is now Medical Director of the Sanatorium.

The Cumberland Valley Medical Society met in London recently for its semi-annual session.

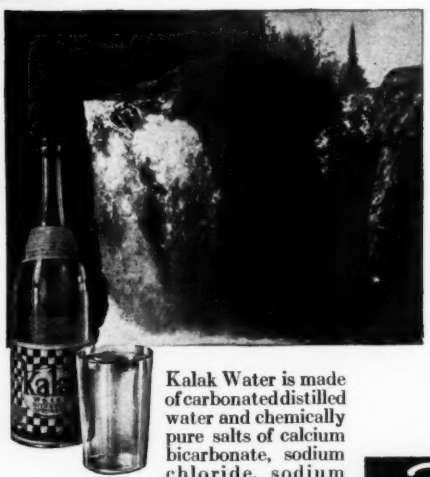
Dr. Arthur T. Hurst, Louisville, has opened new offices at 501 Heyburn Building, with practice limited to internal medicine.

Dr. David E. Jones, Louisville, has opened new offices in the Heyburn Building, with practice limited to orthopedics.

Continued on page 26

A Pure, Palatable, Carbonated

PREPARED WATER



THERE are many conditions, no doubt, where you will want your patient to increase his daily intake of water.

In such cases, why not suggest the use of Kalak Water, the palatable, carbonated alkaline water prescribed by physicians for over twenty years.

Kalak Water is made of carbonated distilled water and chemically pure salts of calcium bicarbonate, sodium chloride, sodium phosphate and bicarbonates of magnesium, potassium and sodium.

Kalak

"Irradiated or activated milk possesses a distinct advantage over all other measures of prophylaxis against rickets. It furnishes an automatic means of treatment, one which does not depend upon the co-operation of the mother..." *

Dr. Alfred F. Hess in the City of New York Department of Health Quarterly Bulletin, Vol. 1, No. 2, 1933 which states editorially, "So many inquiries have come to the Department of Health regarding irradiated milk that we have asked Dr. Alfred F. Hess to prepare the following brief article on the subject for our readers."

ANY BABY TAKING ITS DAILY RATION OF DRYCO IS THEREBY *PROTECTED AGAINST RICKETS!*

**For your convenience Dr. Hess' answer is here given almost in full.*

"The main danger of rickets is that it decreases the resistance and secondly, that it causes deformities, especially malformation of the pelvis which in female patients lead to difficulties in childbirth with danger to mother and to child. Every infant should receive some antirachitic protective agent...The latest method which we have at hand is the use of irradiated food products, products which have been rendered active by subjecting them to ultra-violet rays. The most significant of these products is milk. Every infant has to depend upon milk for its nourishment and depends upon it at the very time of life when rickets is rampant; in other words, during the first year or eighteen months of its existence. From this point of view, *irradiated or activated milk possesses a distinct advantage over all other measures of prophylaxis against rickets.* It furnishes an automatic means of treatment, one which does not depend upon the co-operation of the mother..."

Dryco is never advertised to the Laity.

ACCEPTED AMERICAL MEDICAL ASSN.

Prescribe

DRYCO

Made from superior quality milk from which part of the butterfat has been removed, irradiated by the ultra-violet ray, under license by the Wisconsin Alumni Research Foundation (U. S. Pat. No. 1,680,818) and then dried by the "Just" Roller Process. Send for samples and literature.

All Dryco, in the hands of druggists is irradiated.

Send for Clinical Data and Samples.

The DRY MILK COMPANY, *Inc.*

205 EAST 42ND STREET, DEPT. SM NEW YORK, N. Y.

Continued from page 24

Dr. R. C. Pearlman, Louisville, has opened new offices in the Breslin Building for the practice of surgery, gynecology and plastic surgery.

Dr. W. Gayle Crutchfield, recently of Lexington, has moved to Richmond, Virginia, to become associated with Dr. C. C. Coleman in the practice of neurological surgery.

Dr. Rufus Carter Alley, Lexington, and Mrs. Frances Head Hudson were married in June.

DEATHS

Dr. Clarence Percy Burnett, Paducah, aged 57, died June 30 of carcinoma of the throat.

Dr. Edmund G. Thomas, Benton, aged 81, died July 16.

Dr. Rountree Wickliffe Wood, Cynthiana, aged 60, died July 4 of heart disease.

Dr. Benjamin Frank Johnson, Winchester, aged 67, died July 14 of heart disease.

LOUISIANA

The St. Landry Parish Medical Society held a called meeting recently for the purpose of offering resolutions upon the death of Dr. E. Denegre Martin, New Orleans, a native of St. Landry Parish.

A feature at the Tulane University summer school, New Orleans, was the series of twelve lectures on public health, the first being given by Dr. John H. Musser, Professor of Medicine at the University. Other lecturers in the series were Dr. William Harvey Perkins, Dr. Thomas B. H. Anderson, and Dr. Urban D. Maes, all of New Orleans.

Dr. M. K. King, U. S. Public Health Service, New Orleans, has been relieved from duty in New Orleans and assigned to duty at the Marine Hospital, Savannah, Georgia.

Dr. T. J. Lidell, formerly stationed at New Orleans, has been transferred to the Marine Hospital at Chicago.

DEATHS

Dr. Cecil R. Price, Starks, aged 50, died June 3 of heart disease.

A Valuable Aid In Building Sturdy Bodies

Horlick's, prepared with water, has been shown in tests made at a prominent University hospital to be exceedingly beneficial in promoting better appetite and consistent gains in weight in children. When 2½ to 3 heaping teaspoonfuls are mixed with a glass of milk, the nutritive energy value of the milk is doubled, and the child not only is pleased with the flavor, but the physician is pleased, too, with the results.

Horlick's Malted Milk Corp.
Racine, Wis.

Please send me .....individual weight charts for pre-school children and .....charts for school children, with spaces for physician's medical examination report.

.....

.....

S. M. J.....

MARYLAND

Dr. John Marion Bankhead, Silver Spring, and Miss Eleanor Guy were married in June.

DEATHS

Dr. William Latane Lewis, Kensington, aged 73, died July 12 of acute dilatation of the heart.

Dr. Matthew C. Freilinger, Baltimore, aged 59, died July 5 of carcinoma of the right lung.

Dr. William Sinn Gardner, Elkton, aged 67, died June 5 of cerebral hemorrhage.

MISSISSIPPI

The East Mississippi Medical Society held its regular meeting in August, at which time Kemper, Clark and Leake Counties were officially united with the East Mississippi Medical Society.

Dr. John W. Shackleford, Greenville, has recently completed a ten months course in public health at Harvard University, where he received the degree of Master of Public Health, and has resumed his duties as Director of the Washington County Health Department, succeeding Dr. A. R. Perry.

Dr. W. C. Anderson, Forest, has resigned as County Health Officer of Scott County on account of ill health, and has been succeeded by his son, Dr. W. E. Anderson, Forest.

Dr. O. E. Ringold, formerly of Winona, has located in Cleveland.

Dr. T. W. Huey, Grace, was recently elected part-time Health Officer of Issaquena County.

Dr. John A. Harris, Webb, has been made part-time County Health Officer of Tallahatchie County.

Dr. G. E. Eddy, Heidelberg, recently took a two weeks course in pediatrics at Saluda, North Carolina.

DEATHS

Dr. Henry Leland Noel, Lexington, aged 64, died May 14 of pneumonia and diabetes mellitus.

Dr. J. F. Howell, Kilmichael, aged 37, died July 23 of angina pectoris.

Dr. J. Preston Kennedy, Greenwood, aged 41, died August 5 in a Jackson hospital.

MISSOURI

The Kansas City Southwest Clinical Society will hold its eleventh annual fall clinical conference at Kansas City October 3-5.

The Mississippi Valley Conference on Tuberculosis and the Mississippi Valley Sanatorium Association will meet concurrently in Kansas City October 5-7, with headquarters at the Muehlebach Hotel.

Dr. Theodore H. Aschman, Dr. J. Milton Singleton and Dr. Ralph R. Wilson, all of Kansas City, were approved for certification by the American Board of Obstetrics and Gynecology at a recent examination and meeting.

Dr. C. C. Pflaum, Columbia, Assistant Professor of Pathology, University of Missouri School of Medicine, served by invitation during the summer quarter of the current school year as visiting Assistant Professor of Pathology at the University of Tennessee School of Medicine, Memphis, and as acting Assistant Pathologist to the Memphis City General Hospital.

Dr. W. G. Patton, St. Louis, has been appointed by the St. Louis County Court as Superintendent of the St. Louis County Hospital to serve until December, 1934.

DEATHS

Dr. Katherine Berry Richardson, Kansas City, aged 75, died June 3 of a ruptured gallbladder and peritonitis.

Dr. Charles U. Davis, Fredericktown, aged 61, died May 4 of coronary occlusion and arteriosclerosis.

Dr. Alonzo White, Palmyra, aged 91, died June 25 of hepatic carcinoma.

Dr. Clarence D. Harris, Morley, aged 58, died July 4 of heart disease.

Dr. Robert Burns, Jr., St. Louis, aged 53, died July 17.

Dr. William Baker Sisson, Kahoka, aged 73, died June 24 of heart disease.

NORTH CAROLINA

The North Carolina Pediatric Society met at Wrightsville at the Babies' Hospital in August, with Dr. W. McKim Marriott, St. Louis, as the guest speaker.

Continued on page 28

MELLIN'S FOOD—*MORE* THAN A CARBOHYDRATE

The main purpose of all milk modifiers is the same—to provide carbohydrates in adequate amount as a part of the infant's diet.

Mellin's Food is a carbohydrate—*and more.*

It contains 58.88% maltose and 20.69% dextrins.

It contains 10.35% protein, extracted from the wheat and barley which are its chief ingredients.

It contains 1.05% mineral salts derived from the whole grain.

It contains 3.25% potassium bicarbonate, added during the process of manufacture.

It tends to promote normal bowel action.

It has been favorably known the world over for more than half a century, and its use is consistent with today's sound pediatric knowledge and practice.

Literature and Samples of Mellin's Food Gladly Supplied—to Physicians Only.

MELLIN'S FOOD COMPANY, Boston, Mass.

What's Around the "Puritan Maid" Trade Mark?

Financial Responsibility

Quality — PURITAN MAID — Service

Reputation Dependability

THESE FIVE POINTS ARE YOUR PROTECTION AND GUARANTEE

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Manufacturers of
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ALL TYPES OF GAS EQUIPMENT—OXYGEN TENTS, ROOMS, ETC.
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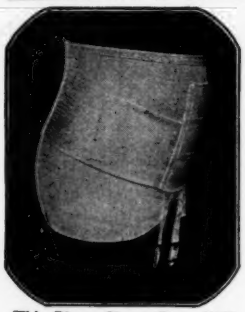
Binder and Abdominal Supporter



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Gives perfect uplift and is worn with comfort. Made of Cotton, Linen or Silk, washable as underwear.

Three distinct types of Storm Supporters — many variations of each type.

STORM supporters are made for all conditions needing abdominal uplift. Ptosis, Hernia, Pregnancy, Obesity, Relaxed Sacro-Iliac, Articulations, Kidney Conditions, Post-Operative Support, etc.

Each Belt Made to Order Ask for Literature

KATHERINE L. STORM, M. D.
Originator, Owner and Maker
1701 Diamond St. Philadelphia

Continued from page 26

Dr. C. N. Sisk has resigned his position with the North Carolina State Board of Health and has located at Valdese for the practice of medicine.

Dr. Frederic M. Hanes, Winston-Salem, has been appointed Professor of Medicine in the School of Medicine, Duke University, and head of the Department of Medicine in the Hospital.

Dr. D. E. Michie, Edgewater Park, is camp physician at Camp Transylvania, at Brevard.

Dr. Alva Brown Craddock and Miss Anne Hartley Luckett, both of Asheville, were married in June.

DEATHS

Dr. James L. Egerton, Hendersonville, aged 76, died July 10 of cerebral hemorrhage.

Dr. Sandy A. Moir, Francisco, aged 70, died May 29 of pellagra.

Dr. Samuel Bee Woodward, Asheville, aged 37, died June 18 of pulmonary tuberculosis.

Dr. Henry Hermann Kapp, Winston-Salem, aged 55, died July 9.

Dr. Milas B. Raymar, Winston-Salem, aged 48, died August 13 of heart disease.

Dr. Samuel N. Harrell, Tarboro, aged 50, died August 6.

Dr. Jchn M. Manning, Chapel Hill, aged 76, died August 31.

Dr. Fletcher R. Harris, Henderson, aged 74, died August 27.

Dr. Richard Leon Kendrick, Elizabeth City, aged 48, died July 26 of heart disease.

Dr. Chalmers Melanchthon Van Poole, Salisbury, aged 79, died July 29 of undulant fever.

Dr. Whitnell Pugh Small, Washington, aged 82, died recently.

OKLAHOMA

Dr. L. J. Moorman, Oklahoma City, has succeeded Dr. J. B. Smith as the University Hospital's Administrative Officer.

Dr. William J. Whitaker, Pryor, announces the completion in the near future of his hospital, and the association with him as assistant of Dr. R. H. Walker, formerly connected with the McBride Reconstruction Hospital at Oklahoma City.

Dr. H. K. Speed, Jr., Sayre, will be associated with his father for a short time before beginning an internship.

The Tulsa Board of Education, under the directorship of Dr. W. A. Walker, announces the discontinuance of its School Health Clinic.

Dr. E. S. Lain, Oklahoma City, has been awarded a Class I award for medical research work on "Electro-galvanic Lesions of the Oral Cavity Produced by Artificial Dentures," announcement being made in the report of the Committee of Awards in the *Journal of the A.M.A.*

Dr. J. M. Lanning has moved from Shawnee to Miami, where he will be associated with Dr. J. M. Kitchen, formerly of Picher, with offices in the Miners' Exchange Building.

Dr. F. C. Evans has moved from Tulsa to Afton to practice medicine.

The Oklahoma County Commissioners and City Manager merged the county and city medical services recently. Dr. Basil Hayes was appointed County Physician and Dr. George Borecky was appointed Field Physician.

Dr. W. B. Smith, Miami, has been appointed County Physician for Ottawa County.

Dr. C. E. Williams, Woodward, was recently reappointed to the County Excise Board of Woodward.

Dr. L. W. Cotton, Enid, is the newly appointed Health Superintendent of Garfield County.

Dr. Ross Jackson, recently from Texas, has returned to his former home at Mangum.

Dr. John D. Campbell has located at Duncan, coming from Houston, Texas, and will be associated with Dr. B. H. Burnett.

DEATHS

Dr. Lloyd Bartmess Foster, Oklahoma City, aged 57, died July 2 of bronchopneumonia.

Dr. Lambert Kuntz, Perry, aged 75, died June 25 of cerebral hemorrhage.

SOUTH CAROLINA

Dr. George G. Moore, formerly of Charleston, has located at Bennettsville for the practice of internal medicine and x-ray diag-

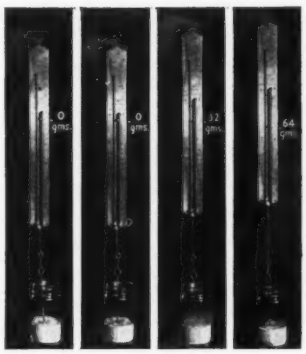
Continued on page 32

CURD TENSION

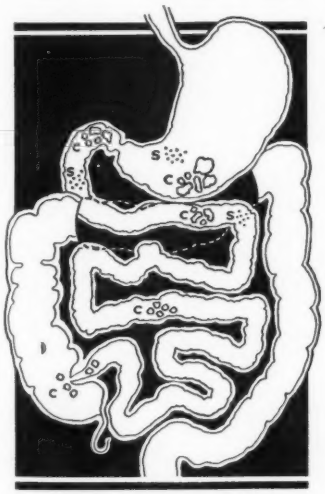
- AND INFANT FEEDING -

ITS · EFFECT · UPON · THE · ASSIMILATION · OF

CARBOHYDRATES



BREAST MILK SIMILAC POWDERED MILK COW'S MILK



C—Cow's milk S—Similac
Schematic drawing of the relative size of the curds of cow's milk and Similac vomited by six weeks old puppies after one-half hour's ingestion.

THE curds of milk contain only a small amount of carbohydrates, sufficient, however, to be a disturbing factor in infant feeding.

"A large part of the digestion and absorption of the carbohydrates takes place in the upper part of the small intestines."[1]

"The disaccharides, maltose, sucrose and lactose, are converted into monosaccharides through the action of enzymes secreted by the small intestine and are absorbed in the form of monosaccharides.

"When absorption is impaired, some sugar may reach the large intestine and here be attacked by the bacteria present. Sugar itself rarely appears in the stool, it being decomposed to form acids and gases."[2]

The large, tough curds of cow's milk are more slowly disintegrated and thus more slowly release the encased carbohydrates than the soft, flocculent curds of SIMILAC.

The disintegration of the curd of cow's milk may not be completed until after the curd, with the encased carbohydrate, has passed that portion of the small intestine where the enzymes for the conversion of disaccharides into monosaccharides are present. There is not this possibility when SIMILAC is fed because the fineness of the curd of SIMILAC does not permit of the encasement of carbohydrates to any extent.

The finer the curd the greater the surface area. The greater the surface area the more exposed are the fats, carbohydrates, proteins and salts to the digestive enzymes. Result . . . a more complete utilization of the food elements.

[1] London & Polowzowa: Zeitschr. f. physiol. Chem. 1906, XLIX, 328.
[2] Marriott: Infant Nutrition, pg. 81.

Samples and literature will be sent on receipt of your prescription blank.

SIMILAC—Made from fresh skim milk (casein modified); with added lactose, salts, milk fat and vegetable and cod liver oils.

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DIETETIC LABORATORIES, INC.,
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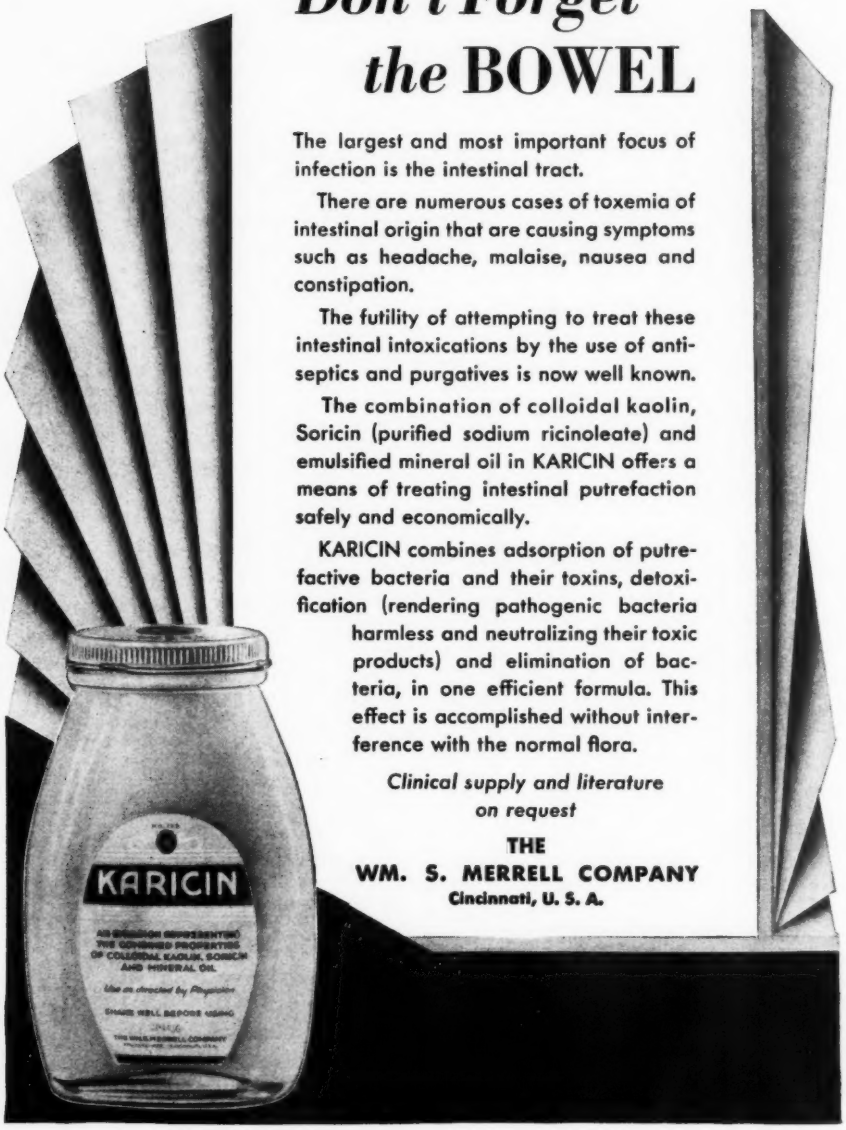
WHEN LOOKING FOR A FOCUS OF INFECTION—

Don't Forget the BOWEL



The largest and most important focus of infection is the intestinal tract.

There are numerous cases of toxemia of intestinal origin that are causing symptoms such as headache, malaise, nausea and constipation.

The futility of attempting to treat these intestinal intoxications by the use of antiseptics and purgatives is now well known.

The combination of colloidal kaolin, Soricin (purified sodium ricinoleate) and emulsified mineral oil in KARICIN offers a means of treating intestinal putrefaction safely and economically.

KARICIN combines adsorption of putrefactive bacteria and their toxins, detoxification (rendering pathogenic bacteria harmless and neutralizing their toxic products) and elimination of bacteria, in one efficient formula. This effect is accomplished without interference with the normal flora.

Clinical supply and literature on request

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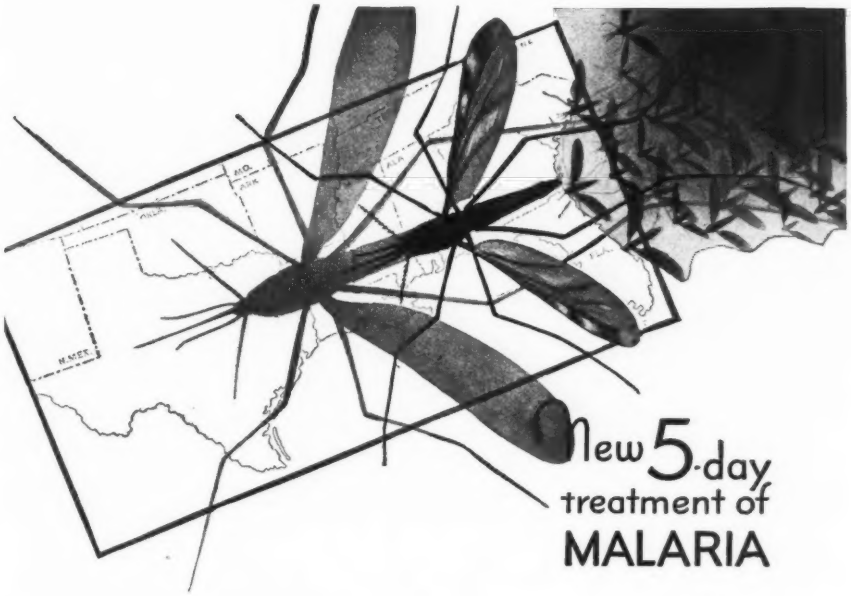

Hitherto: **THREE WEEKS'** treatment with quinine has been commonly required to eradicate all parasites from the blood of the malarial patient.

Now: **FIVE DAYS'** administration of Atabrine is sufficient to destroy the schizonts which produce the acute paroxysms and the gametocytes which transmit malaria through the mosquito.

Atabrine has none of the by-effects of quinine which so often interrupt treatment and interfere with the patient's occupation. Relapses are much less likely to occur.

Moreover, Atabrine is economical as only five days' medication is usually necessary in tertian and quartan malaria.

DOSAGE: Adults, one tablet three times daily for 5 successive days. Children, one-half to one tablet, once to thrice daily according to age.

Pamphlet containing detailed instructions will be sent to physicians on request.

ATABRINE
Trademark
(*Pronounced At'a-breen*)
Brand of Chinacrin

Supplied in tablets of 0.1 Gm. (1½ grains), with groove for division, in tubes of 15.

WINTHROP CHEMICAL COMPANY, Inc.
170 Varick Street, New York, N. Y.
275M

Continued from page 28

nosis and therapy, and will be connected with the Marlboro County General Hospital as roentgenologist.

Dr. E. M. Hicks, Florence, has succeeded Dr. James McLeod as President of the Rotary Club of Florence.

Dr. Hillyear Rudisill, Jr., Charleston, has left for London, where he will study at the National Radium Institute.

Dr. J. Howard Stokes, Charleston, returned recently from Birmingham, Alabama, where he spent a year as resident physician at the Birmingham Children's Hospital, and expects to locate at McBee for practice.

Dr. W. A. Hart has returned to Columbia to locate for the practice of obstetrics after an internship in Baltimore.

Dr. Irving S. Barksdale, Greenville, recently made a tour of the West Indies, northern coast of South America and the Canal Zone for the purpose of observing public health conditions.

Dr. L. R. Poole has located at Easley to practice medicine.

Dr. John R. Thomas has located at Gaffney, and is associated with Dr. J. H. Sanders.

Dr. Boyce D. Brooker has located at Greenville to practice.

Dr. Francis P. Owens and Dr. Harold P. Pope have recently completed their internship and have located in Union for the practice of medicine.

Dr. Martin Miller and Miss Daisy Bowen, both of Laurens, were married recently.

Dr. Vaughn Rhea Eleazer, Chapin, and Miss Ella Dunn were married in June.

Deaths

Dr. Charles Andrew McLurkin, Chester, aged 66, died July 2 of acute gastro-enteritis and nephritis.

Dr. Rufus E. Mathias, Irmo, aged 54, died July 7 of cerebral hemorrhage.

Dr. Henry William Rice, Columbia, aged 64, died June 24 of heart disease.

Dr. John Benjamin Adams, Honea Path, aged 51, died June 1 of pneumonia.

TENNESSEE

The Tennessee State Board of Medical Examiners, at a recent all-day session in Nashville, elected the following officers for a two-year term: Dr. B. L. Simmons, Nashville, President; Dr. J. K. Blackburn, Pulaski, Vice-President; and Dr. H. W. Qualls, Memphis, Secretary-Treasurer.

Dr. J. O. Barker and Dr. T. C. Rice have opened offices at Trenton.

Dr. J. H. Gammon, Knoxville, formerly associated with the Eastern State Hospital at Knoxville, has opened offices at 315 Ogle Street.

Dr. Zaven M. Seron has opened offices in Cleveland for the practice of pediatrics, having completed a term as resident physician at the Children's Hospital at Chattanooga.

Dr. D. B. Andrews has opened an office in Lewisburg.

Dr. Philip C. Elliott, Nashville, has opened offices at 2629 Gallatin Road, practice limited to children.

Dr. J. B. Bond has opened his office at Martin for private practice.

Dr. S. B. McClary and Dr. S. Boyd McClary, Jr., Etowah, have moved into new offices on Tennessee Avenue.

Dr. R. Neil Brown, recently of Dayton, Ohio, has returned to Johnson City, his former home, for the practice of medicine.

Dr. Jesse Armstrong, Chattanooga, formerly connected with the Newell Sanitarium, has opened an office in the Medical Arts Building.

Dr. Hale E. Cullom, Nashville, has become associated with his father, Dr. M. M. Cullom, in the practice of ophthalmology.

Deaths

Dr. William F. Waters, Flat Rock, aged 50, died June 17 of cerebral edema and pneumonia.

Dr. Henry Nelson Pulliam, Memphis, aged 44, died July 10 of heart disease.

Dr. James M. Webb, Ooltewah, aged 63, died June 15 of chronic arthritis.

Dr. W. L. Hancock, Lebanon, aged 81, died June 27 of colitis.

Dr. Alonzo Willett Carr, Knoxville, aged 78, died July 2 of cerebral hemorrhage and organic heart disease.

Dr. James B. Cox, Huntington, aged 76, died July 9 of arteriosclerosis.

Dr. John Metcalf Maury, Memphis, aged 64, died July 10 of heart disease.

Continued on page 34

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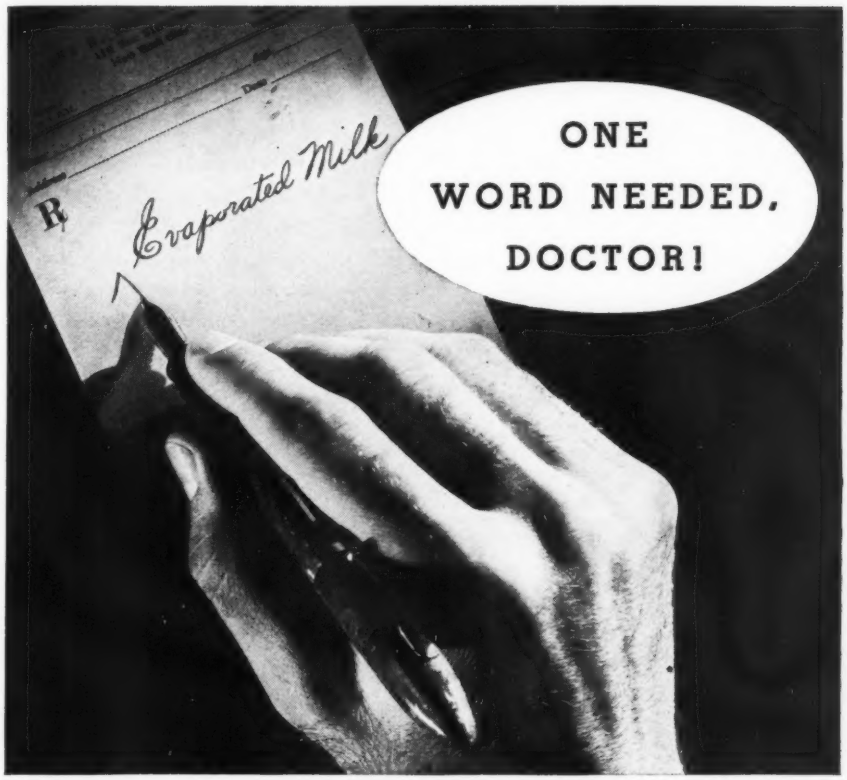

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EVAPORATED MILK

Continued from page 32

Dr. Joseph L. Edwards, Brownsville, aged 69, died July 7 of cerebral hemorrhage.

Dr. Dana Monroe Collier, Nashville, aged 46, died July 2 of bronchopneumonia.

Dr. R. M. Graham, Clarksville, aged 51, died July 31.

Dr. Charles Thomas Carroll, Morristown, aged 60, died July 26.

TEXAS

The Thirteenth District Medical Society and the Fort Worth Medical and Surgical Clinics will hold a joint session at Fort Worth October 10 and 11.

Dr. Felix L. Butte, formerly of Galveston, has moved to New York City.

Dr. G. W. Edgerton has moved from San Benito to Harlingen.

Dr. P. B Gardner has moved from Marshall, Texas, to Marshall, Oklahoma.

Dr. Ross Jones has moved from Houston to Waco.

Dr. Gerald E. King has moved from San Antonio to Smiley.

Dr. C. W. Ory has moved from Texon to Comanche.

Dr. D. C. Peterson, formerly of Baltimore, Maryland, has located at Longview.

Dr. S. P. Sellers has moved from Ladonia to Honey Grove.

Dr. Ira O. Stone has moved from San Saba to Richland Springs.

Dr. Hugh B. Tandy has moved from Abilene to Ozona.

Dr. G. H. Wood has moved from Longview to Big Spring.

Dr. Fred S. Harrell, formerly of Olney, has moved to New York.

Dr. J. C. Hennen has moved from Memphis to Seymour.

Dr. V. S. Rabb, formerly of Somerville, has moved to Detroit, Michigan.

Dr. J. Valton Sessums has moved from Galveston to San Angelo.

Dr. J. W. Tappan, formerly of Point Loma, California, has located at El Paso.

Dr. J. A. Odom, Kirkland, has been doing postgraduate study in hospitals of Denver.

Dr. R. B. Anderson, Sr., has moved from Corpus Christi to Seguin.

Dr. Frank H. Austin has moved from Temple to Carlsbad, New Mexico.

Dr. Felix V. Bryant has moved from Martin's Mills to Athens.

Dr. and Mrs. W. M. Taylor, Goree, were hosts at a dinner recently, entertaining members of the Baylor-Knox-Haskell Counties Medical Society.

Dr. W. B. Veazey, Huntsville, has been appointed medical supervisor of the Texas prison system, succeeding Dr. E. W. Anderson, resigned.

Dr. T. B. Bass, Abilene, has been reappointed for his thirteenth consecutive term as Superintendent of the Abilene State Hospital.

Dr. E. O. Chimene, Austin, formerly Assistant City Health Officer, is the newly elected Director of the new City-County Health Unit, appointment having been made by the Travis County Commissioners' Court and the Austin City Council.

Dr. D. C. Peterson, Austin, has succeeded Dr. Gean S. Atkinson as Supervisor of the Gregg County Health Unit.

Dr. George F. Powell, Terrell, has been reappointed Supervisor of the Terrell State Hospital.

Dr. H. L. Warwick, Fort Worth, recently demonstrated his original method of treatment of hay fever before groups at Northwestern University Medical School in Chicago and in Mellen and Janesville, Wisconsin

Dr. Glenn Hall Ricks, Brady, and Miss Mary Boyd Fleming were married in June.

DEATHS

Dr. John S. Terry, Ennis, aged 72, died June 3 in an automobile accident.

Classified Advertisements

ASSISTANCE OFFERED TO MEDICAL WRITERS. Research. Abstracts. Translations (all languages). Papers prepared from author's data. Ten years' experience with leading physicians and appointments on medical journals of highest standing. I employ no assistants; all my work is done personally and is reliable. Florence Annan Carpenter, 413 St. James Place, Chicago, Ill.

Dr. William Claiborne Graves, Borger, aged 65, died July 1 of pneumonia.

Dr. William O. Thomas, Irving, aged 52, died June 21 of acute pellagra.

Dr. Lester Everett Smith, Tyler, aged 59, died July 5 of acute pyelonephritis.

Dr. Joseph Howard Ogle, Garland, aged 72, died June 20.

Dr. Horatio Seymour Joseph, Harlingen, aged 65, died in June.

Dr. T. H. Barber, Colorado, aged 69, died May 26.

Dr. Boyd Cornick, San Angelo, aged 77, died July 4.

Dr. Richard Henry Harrison, Bryan, was drowned July 17 while in swimming at Galveston.

VIRGINIA

Dr. C. C. Coleman, Richmond, will have associated with him in the practice of neurological surgery Dr. W. Gayle Crutchfield, formerly of Lexington, Kentucky. Dr. Crutchfield succeeds Dr. J. G. Lyerly, who has moved to Jacksonville, Florida.

Dr. C. L. Fifer has moved to Alexandria, with offices at 904 Prince Street, coming from University.

Dr. W. Harman Evans, formerly of Lynchburg, has moved to Concord Depot.

Dr. F. L. Apperly, Richmond, Professor of Pathology at the Medical College of Virginia, has been studying in London during the summer.

Dr. Booker Lee has moved from Roanoke to Pulaski, practice limited to diseases of the eye, ear, nose and throat.

The Southwestern Virginia Medical Society held its semi-annual meeting at Wytheville on September 15.

Dr. Charles Neill Scott has located at Richmond with offices at 2219 Park Avenue for general practice, having completed his internship at Stuart Circle Hospital.

Dr. Meyer Vitsky, Richmond, has opened offices at 1103 West Franklin Street for general practice, emphasizing obstetrics.

Dr. Richard B. Nicholls, Norfolk, has moved into new offices at 808 Wainwright Building for the practice of obstetrics and gynecology.

Dr. Charles O. Moody has located at Hampton for general practice.

The Southside Virginia Medical Association held its quarterly meeting at Emporia September 12.

The Augusta County Medical Association, at its annual meeting at Staunton in August, elected the following officers for the coming year: Dr. H. T. Hawkins, Waynesboro, President; Dr. T. R. Rolston, New Hope, Dr. C. W. Rodgers, Staunton, and Dr. J. B. Catlett, Staunton, Vice-Presidents; Dr. W. F. Hartman, Swoope, reelected Secretary; and Dr. T. M. Parkins, Staunton, reelected Treasurer.

The Loudon County Medical Society at its meeting in July, reelected officers for the coming year as follows: Dr. Harry Gibson, President; and Dr. W. O. Bailey, Secretary-Treasurer; both of Leesburg.

Dr. Frederick Randall Eastland, National Soldiers' Home, and Miss Muriel Mann were married in June.

Dr. Fred Taylor Renick, Crozet, and Miss Frances Hughes were married July 10.

Dr. Randolph Bryan Grinnan, formerly of Norfolk, and Miss Adelaide Richardson Buist were married recently.

Dr. Robert Buckley and Miss Maxine Elizabeth Frix, both of Richmond, were married August 8.

Dr. Howe Reese Coleman, Jr., Lexington, and Miss Virginia Hightower were married August 22.

DEATHS

Dr. T. G. Brown, Gainesville, aged 76, died August 3.

Dr. Ernest Helm Muse, Roanoke, aged 52, died June 10.

Dr. William Samuel Briggs, Dinwiddie County, aged 76, died August 8 as the result of injuries received in a fall.

WEST VIRGINIA

Dr. R. J. Condry, Elkins, of the staff of the Davis Memorial Hospital, has gone to Europe to spend some months studying in various European clinics.

Dr. L. I. Hoke, Quinwood, has moved to Layland to practice.

DEATHS

Dr. Thomas Edward Walton Grover, Huntington, aged 76, died May 28 of pernicious anemia.

Dr. Fred Stansbury, Beckley, aged 43, died August 10.

Dr. William F. Walker, Elkview, aged 58, died July 26 in a Charleston hospital.

Urine actually becomes GERMICIDAL

CAPROKOL (Hexylresorcinol, S & D) is taken by mouth and excreted by the kidneys appearing largely as a conjugate, but in sufficient concentration in the free state to impart active bactericidal properties to the urine.

Hence, its activity in the treatment of urinary infections.

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If this tired, worried, over-worked mother were using Pablum for her babies' cereal feedings, she could have slept that extra much-needed hour instead of losing her temper while her children clamor for breakfast. For she can prepare Pablum in an instant, directly in the cereal bowl, simply by adding water or milk of any temperature—salt, cream and sugar for the older child and herself.

GETTING up an hour earlier in the morning is an inconvenience for most persons, but for the mother of young babies it is a hardship, sometimes almost tragic, frequently nullifying the best-planned pediatric advice.

This is especially true in the case of the nursing mother whose supply and quality of breast milk are affected by emotional shocks resulting often in agalactia and sometimes giving rise in the baby to diarrhea, colic, and even convulsions. Furthermore, the mother's emotional stress brings about a train of behavior on her part which is reflected in the child's psychologic reactions so that a vicious circle of bad habit formation is set up.

From this angle, the recent introduction of the pre-cooked form of Mead's Cereal, known as Pablum, assumes new importance in the doctor's psychological handling of both mother and child, quite aside from its nutritional value.*

Because Pablum can be prepared in a minute, the mother can sleep the extra hour she would otherwise be compelled to spend in a hot kitchen cooking cereal. Added rest means better poise, so that petty annoyances do not bring jaded nerves. Prompt feedings prevent many childhood tantrums, and a satisfied baby usually eats better and enjoys better digestion and growth.

*Like Mead's Cereal, Pablum represents a great advance among cereals in that it is richer in a wider variety of minerals (chiefly calcium, phosphorus, iron, and copper), contains vitamins A, B, E, and G, is base-forming and is non-irritating. Added to these special features, it is adequate in protein, fat, carbohydrates, and calories. Pablum consists of wheatmeal, oatmeal, cornmeal, wheat embryo, yeast, alfalfa leaf, and beef bone.

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Please enclose professional card when requesting samples of Mead Johnson products to cooperate in preventing their reaching unauthorized persons

Every day that Dextri-Maltose is manufactured, control samples for bacteriological analyses are secured from certain points in the process which experience has shown give an accurate picture of the bacteriological condition of the product in the different steps of its manufacture. As a result of experiment and experience, it has been demonstrated that by exercising certain strict sanitary control measures and precautions, the bacteria count can be reduced to the point where the finished product approaches practical sterility. The Petri-dish at right shows a plate count of only 40 bacteria per gram, obtained from a package of Dextri-Maltose selected at random.

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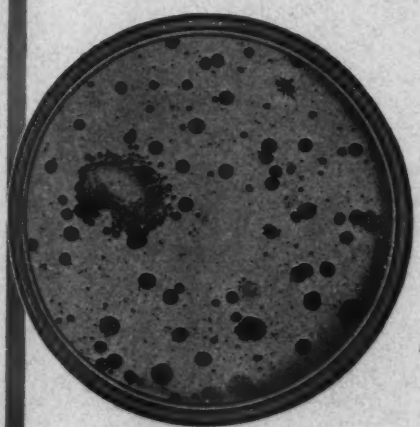

On the other hand, the Petri-dish at the left visualizes the potential danger that may accompany lack of experience. At 37° C., this sample (bought in the open market) showed a bacteria count of 420,000 per gram (compared with 40 per gram in Dextri-Maltose, as mentioned above). Every physician is deeply concerned about the pasteurization, certification, etc., of the cow's milk his babies are fed on, but even sterile milk would give the infant *over seventeen million* bacteria per daily feeding when "modified" with a carbohydrate such as is represented by the Petri-dish at the left.

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THE very big smile on this very little lady is a greeting to her doctor. She has quite a case on him. And he, shameless fellow, on her. But the course of their love is studded with pitfalls. For when clinical thermometers, tongue depressors, and medicine come in the door, love is likely to fly out of the window.

You can imagine then how gratefully he (and so many of his fellow physicians) welcomed an innovation like Parke-Davis Haliver Oil with Viosterol-250D! Given in dainty drops instead of terrifying teaspoonfuls, it has simplified and solved the troublesome question of how to administer vitamins A and D scientifically and at the same time *pleasantly*. And it has removed an important threat to the affection that exists between so many doctors and their little patients. As you know, Parke-Davis Haliver Oil with Viosterol-250 D is Council-Accepted. It contains not less than 80 times the vitamin A potency of a standard cod-liver oil testing 400 U. S. P. units per gram. It is equal to Viosterol-250 D in vitamin D potency. Supplied in 5-cc. and 50-cc. vials with dropper and in 3-minim capsules, boxes of 25 and 100. You are invited to write our Medical Service Department, at Detroit, for a sample box of capsules and literature.

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